

SCIENCE *exploration* DAY

scienceexplorationday.com **BUFFALO**

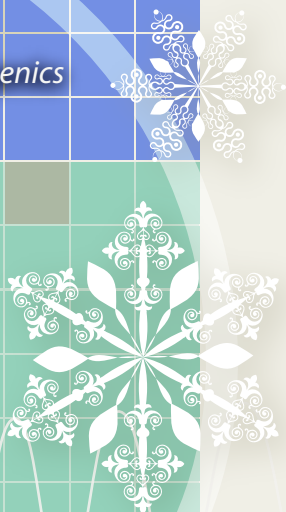


Wednesday, March 22, 2017 • University at Buffalo, Amherst Campus

Featuring Keynote Speaker:

Bill Owens, Praxair

The Cold, Cold World of Cryogenics



**Niagara Frontier
Science Supervisors**

New York
Sea Grant

GREAT LAKES PROGRAM
 **University at Buffalo**

**Western Section of the
Science Teachers Association
of New York State**

Keynote Presentation

All students and teachers will attend this presentation

The Cold, Cold World of Cryogenics

Presented by:

Bill Owens

Senior Engineering Consultant for Praxair, Inc.

Lecture and demonstration on Cryogenics, including oxygen-enriched flammability properties. This session will feature many experiments using nitrogen and oxygen cryogenic liquids to demonstrate both their properties and the effects cold temperatures have on other materials.

Fig. 53. r. 720.





Small Group Presentations (S)



S-1

3-D Printing, Robots, and Buildings

Dr. Ken English, Deputy Director, Sustainable Manufacturing and Advanced Robotic Technologies Community of Excellence, Susan Witt, Learning Lab Manager, Buffalo Manufacturing Works

How do 3-D printers and robots come together to create buildings? During this session, you will see how 3-D printers work and understand how robots can help make people's work lives more engaging, cleaner, and safer. You will also see how robots are used in factories to make more products faster and better than ever before.

S-2

Science in Your Life (That you probably never think about!)

Dr. Don Bird, Professor Emeritus, Science Education, Buffalo State College

We are surrounded by science—but we take it all for granted! This session will offer an innovative glimpse of the science incorporated in your daily life. You may not have considered or even realized that science is around you throughout the day. Join in this interesting and interactive session to learn more!

S-3

Explore the Human Brain

Michelle Sudyn, PhD Candidate in Neuroscience, University at Buffalo

Come learn about the brain! Students will explore human brains from UB's Brain Museum, getting hands on experience looking at macroscopic structures. Microscopic structures, such as different types of neurons will be observed under microscopes. Various senses that are controlled by the brain will be explored as well. Discover the vast field of neuroscience research!

S-4

Geology ROCKS!!

Carolyn Roberts, Graduate Student, Geology Department, University at Buffalo

Learn about the fascinating science of geology from UB graduate students! The UB Geology Department is currently involved with cleaning the local groundwater supply, understanding volcanic processes on both Earth and on Mars, studying coral reefs, and much more. This interactive session includes brief tours of UB Geology research laboratories, and a hands-on mapping adventure that is out of this world!

S-5

Tour of UB's Electrical Engineering Cleanroom

Dr. David B. Eason, Technical Director, Shared Instrumentation Laboratories, School of Engineering and Applied Sciences, University at Buffalo

UB's Cleanroom is truly a clean room, with many precision tools that enable faculty and students to engage in research, processing and microfabrication of electronic devices. This highly-controlled environment minimizes the presence of pollutants and airborne particles as small as 0.5 micron in size – that's 1/200th the diameter of a human hair – to less than 1,000 per cu. ft. By comparison, the outside air of a typical urban environment contains up to 35,000,000 particles per cu. ft. In this extremely clean space, researchers use a photolithography process, and a variety of tools like deposition systems, etching systems and scanning electron microscopes to develop and examine devices that power familiar electronics like computers and cell phones.

S-6

Great Lakes – Great Time to be a Biologist! Learn About Biology in the Lower Great Lakes

Denise Clay/Marcus Rosten - U.S. Fish and Wildlife Service, Lower Great Lakes Fish & Wildlife Conservation Office

Interested in learning about lake biology and being a biologist in the Great Lakes? This session covers the history and ecology of the lower Great Lakes, including how they were formed and their past and current condition. Also learn about the exciting science happening on and off the water first-hand from a fish biologist who has spent time on the water. This talk will cover everything from invasive species to Lake Sturgeon, a giant fish that can live for over 100 years, and will highlight some of the fascinating changes that are taking place in the Great Lakes, not so very far from your doorstep.

S-7

What will be our Next Big Advances in Cancer?

Richard P. Hershberger, PhD, MBA, Chief Academic Officer, Roswell Park Cancer Institute , Dean, Roswell Park Graduate Division, University at Buffalo

Cancer vaccines? Light and heat treatments? Prevention drugs? Genetically customized treatments? Targeted antibodies? Tanning and e-cigarette avoidance? Learn what Roswell Park and other cancer researchers are doing to create new ways of preventing, diagnosing, and surviving cancer. Where will you fit in on the cancer team, and what new ideas can you come up with to fight cancer?

S-8

Astronomy: Portable Star Lab Planetarium

Tim Collins, Whitworth Ferguson Planetarium at Buffalo State College

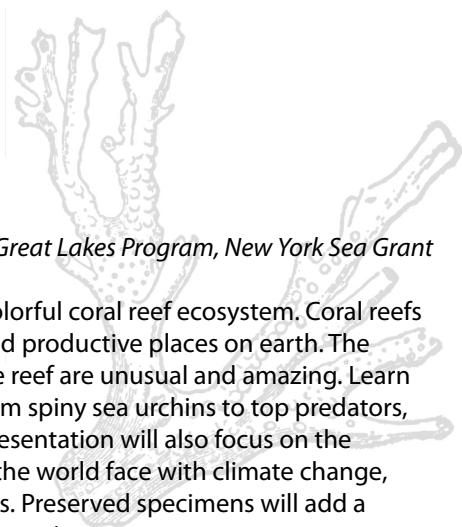
Finding their way around the night sky via a portable planetarium, participants will observe projections of constellations, stars and galaxies and learn more about the nature of the universe.

S-9

Colorful Coral Reefs

Helen Domske, Associate Director, Great Lakes Program, New York Sea Grant

Take an underwater look at the colorful coral reef ecosystem. Coral reefs are some of the most beautiful and productive places on earth. The creatures and relationships on the reef are unusual and amazing. Learn about the residents of the reef from spiny sea urchins to top predators, like sharks and moray eels. The presentation will also focus on the challenges that the coral reefs of the world face with climate change, over-harvesting and coral diseases. Preserved specimens will add a hands-on component to the presentation.



S-10

Really Gross Anatomy and Physiology

Don Gill, Jr., Instructor, Erie Community College, South Campus

An interesting laboratory presentation of preserved specimens prepared to various levels of dissection. Comparative anatomy and physiology will be discussed. (Not for the faint of heart.)

S-11

Tour the Digital Manufacturing Laboratory (DML)

Mr. Donald Goralski, Director, Shared Instrumentation Laboratories and Sourabh Manoj Saptarshi, Graduate Student, School of Engineering and Applied Sciences, University at Buffalo

Tour our brand new Additive and Digital Manufacturing Laboratory to learn about the basics of 3-D printing! The DML is home to high-definition 3-D digital scanners as well as desktop and production-grade printers (PLA, ABS, FDM, SLA, FTI, Polyjet, composite, and more!) The DML provides capabilities for precision rapid prototyping and manufacturing of highly detailed and durable 3-D parts. Please join us to view the facility, and sample some of the 3-D parts we have printed using the various technologies.

S-12

Fluorescent Minerals

Dino Zack, P.G., Geologist/Project Manager, AECOM Technical Services, Inc.

Approximately 4,000 different mineral species have been identified at this time. Over 500 of them are known to fluoresce visibly in some specimens. This presentation will feature various types of luminescence with a detailed explanation of mineral fluorescence. Fluorescent rock and mineral specimens from New York State, as well as world-know locations, will be on display and used to demonstrate the many types of luminescence including fluorescence, phosphorescence, triboluminescence, thermoluminescence, and tenebrescence.

S-13

Would You Drink *That*?

The Science and Engineering of Drinking Water

Dr. James N. Jensen, Professor, Dept. of Civil, Structural and Environmental Engineering, University at Buffalo

Have you ever wondered where tap water and bottled water come from? Tour the drinking water research facilities at UB to see demonstrations of the science behind drinking water treatment. Find out why prescription drugs may actually show up in drinking water.

S-14

Structural Engineering and Earthquake Simulation Tour

Dr. Pinar Okumus, Assistant Professor and Dr. Mettupalayam Sivaselvan, Assistant Professor, Civil, Structural and Environmental Engineering, University at Buffalo

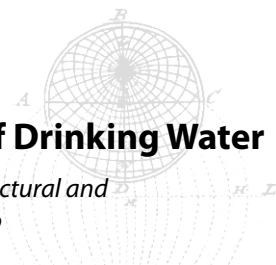
The Network for Earthquake Engineering Simulation (NEES) laboratory is a part of the Structural Engineering and Earthquake Simulation Laboratory (SEESL). The laboratory is capable of conducting testing of full or large-scale structures using dynamic or static loading. This is enabled by the availability of two shake (earthquake simulation) tables; large-scale dynamic and static servo-controlled actuators; and a 40-ton capacity crane. Participants will hear a presentation describing this very unique facility and observe an example of the nature of seismic testing using a "Mini-Shake Table" prior to the tour of the laboratory.

S-15

Caring For Our Four-Legged Friends - Discover the World of Veterinary Medicine

Marie Lockhart, DVM - Medaille College

Do you love animals, science, and helping people? Then veterinary medicine may be right for you! With the help of a Guiding Eyes Dog in training, you will learn about the wonderful and exciting field of veterinary medicine and how to become a veterinarian and a veterinary technician.



S-16

Electrical Engineering - Interactive Tour With Hands-on Participation

Electrical Engineering – Interactive Tour

*Dr. Jennifer Zirnheld, Electrical Engineering, University at Buffalo,
plus colleagues: Dr. Dimitris Pados, Dr. Stella Batalama, Dr. Zhi Sun,
Dr. Nick Mastronarde, Dr. Qiaoqiang Gan, Dr. Uttam Singiseti, Dr. Josep Jornet,
Dr. Erik Einarsson and Dr. Kevin Burke*

Electrical Engineering is an integral part of our lives, contributing on some level to nearly everything we do. Electrical Engineers provide power and energy solutions to light our homes and energize our consumer electronics; develop biomedical instrumentations to save lives; use nanotechnology to produce new materials and devices; provide entertainment with consumer electronics and video games; and advance new green technologies. The tour will focus on interactive demonstrations within several of the research laboratories in the Electrical Engineering Department.

S-17

Tour of Chemistry Department Research Laboratories

*Dr. Timothy R. Cook, Assistant Professor and Dr. David C. Lacy,
Assistant Professor, Department of Chemistry, University at Buffalo*

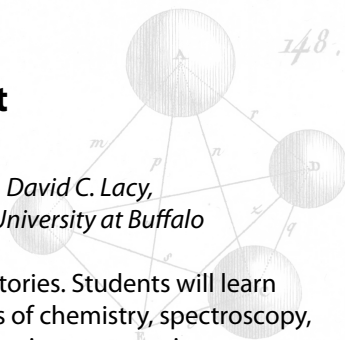
This session includes tours of research laboratories. Students will learn about ongoing research activities in the areas of chemistry, spectroscopy, and nanotechnology, including state-of-the art instrumentation.

S-18

Space Debris: It's Just Floating Space Junk, So Why Do We Care?

*Dr. John L. Crassidis, Professor and Director, Center for Multisource Information
Fusion, Dept. of Mechanical & Aerospace Engineering, University at Buffalo*

Currently there are thousands of pieces of space junk, ranging from relatively small objects such as astronaut tools, to large objects such as defunct satellites. This presentation will show why we need to carefully track the space junk that is already in orbit, and also reduce the amount that is generated in the future. Audience participation will be strongly encouraged to provide ideas on how to reduce the dangers space junk poses, followed by ideas that are currently being developed and tested.



S-19

Coalesce Bio-Art Lab Tour

Artist Paul Vanouse, University at Buffalo and Dr. Sandra Small and Dr. Solon Morse, Genome, Environment and Microbiome Community of Excellence at the University of Excellence.

The Coalesce Center for Biological Arts brings together two fields that are not often thought of together: science and art. It is a laboratory studio which enables hands-on creative engagement with the tools and technologies of the life sciences. The tour will allow students to experience this unique facility and what it means to be a bio-artist.

S-20

Luminol: Shedding Light on Crime

Dr. Ted Yeshion, Professor - Department of Criminal Justice & Criminalistics, Gannon University

Crimes of violence frequently involve bloodshed. In many cases, the perpetrator has an opportunity to wash away blood from the scene. Luminol is an extremely sensitive presumptive blood test that can detect trace amounts of blood invisible to the naked eye. This presentation will introduce the student to how forensic investigators use Luminol to provide chemical indications for the presence of blood and how they are then able to use that information to reconstruct events that may have taken place during the commission of a violent crime. Actual case examples will be used to demonstrate the power of this investigative tool.

S-21

Tour of the Physics Department Research Laboratories

Dr. Iashvili, Professor, Department of Physics, University at Buffalo

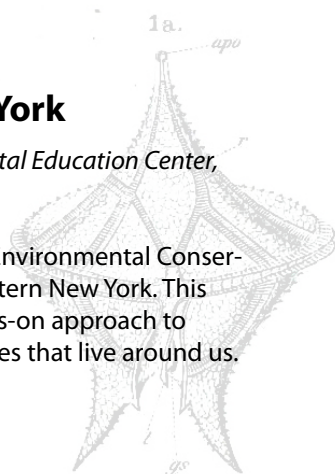
The Physics Department has vigorous cutting-edge research programs in new materials, nanoscience, quantum devices, biomolecular physics, cosmology, high-energy physics, and atmospheric physics. This session includes tours of research laboratories where students will learn about ongoing research activities and state-of-the-art instrumentation.

S-22

The WILD side of Western New York

*Kristen Rosenberg, Reinstein Woods Environmental Education Center,
NYS Department of Environmental Conservation*

Join a naturalist from the NYS Department of Environmental Conservation to learn about the wildlife found in Western New York. This presentation will offer information and a hands-on approach to learning about some of the interesting creatures that live around us.



S-23

Microbes Up-Close and Personal

*Dr. Laura Rusche, Associate Professor, Department of Biological Sciences,
University at Buffalo*

Tour a microbiology lab that studies yeasts and molds (fungi). In this hands-on activity, students will have the opportunity to view yeast, molds and other fungi in the microscope, culture fungi from their hands, and learn how these organisms respond to nutritional changes in their environment.

S-24

Who? Where? When? Tracking fish by their DNA!

Dr. Lauren Sassoubre, Assistant Professor, Civil, Structural and Environmental Engineering, University at Buffalo

Can the same techniques that are used by forensic scientists to track people be used to track animals in the environment? Yes! This presentation will help you understand how DNA extracted from the environment can be used to track fish and invertebrates in the Great Lakes. Learn how this new and exciting field of science is changing our understanding of the environment and what lives in it. We will discuss emerging applications of DNA-based techniques and how they can improve the way we monitor fish stocks and ecosystem health.

S-25

Tour of Biological Sciences Department Research Laboratories

*Dr. Michael Yu, Associate Professor, Department of Biological Sciences,
University at Buffalo*

Students touring Dr. Yu's laboratory will get an idea about what it's like to use the budding yeast as a model organism. They will be able to visualize what budding yeast looks like via microscope and how this lab uses molecular biology and biochemical techniques to study important questions in the field of biological sciences.

S-26

Investigating "Paranormal" Mysteries

Dr. Joe Nickell, Paranormal Investigator, Skeptical Inquirer Magazine

A presentation featuring a revealing and entertaining look at such mysterious phenomena as the ghost at Mackenzie House and cases of alleged "spontaneous human combustion" - from the speaker's own case files and all examined from the scientific point-of-view.

S-27

Living Adaptations—Survival in Nature Through Change!

Mark Carra, Naturalist for Buffalo Audubon Society

Come and explore nature's diversity with some of the unique creatures that are found on our planet. Meet some live animals that illustrate the role that adaptation plays in the survival of species and experience the science of nature as it lives and breathes. The Buffalo Audubon Society is devoted to promoting the appreciation and enjoyment of the natural world through education and stewardship.



S-28

Wild Weather!

Judy Levan, Warning Coordination Meteorologist, National Weather Service

Weather affects everyone, everyday. Western New York and the nation are experiencing unusual weather events. Meteorologists have the satisfaction of helping others during these times of wild weather. When the weather is at its worst, forecasters are in great demand. Learn about thunderstorms and tornadoes and how you can stay safe as we discuss and view some of the damage from local severe storms.

S-29

Chromosomes and Cancer

AnneMarie W. Block, Ph.D., FACMG, Director Clinical Cytogenetics Laboratory, Roswell Park Cancer Institute

This presentation will be an introduction to the field of Cancer Cytogenetics. The genomes of cancer cells are very unstable, often characterized by gains/losses of whole chromosomes and re-arrangements between chromosomes. This specialized area of chromosome analysis examines the genetic changes that occur in the cells of cancer patients. Students will receive instruction in this cutting-edge field of genetics. The relevance of these findings to patient diagnosis and prognosis will be discussed. Students will be shown techniques used in the laboratory and will be given the opportunity to cut-out an actual karyotype.

S-30

A "Flood" of Weather Information

Kirk Appfel, Senior Meteorologist, National Weather Service

Western New York has experienced an increase in heavy rain events and further increases are projected. Learn about the different types of flooding that affect the region -- riverine, flash floods, ice jams, for example -- and how the National Weather Service's monitors, forecasts and warns for all types of flooding and what you can do to be prepared

S-31

Cosmology – The Real Bing Bang Theory!

Dr. Dejan Stojkovic, Physics Department University of Buffalo

You know that the Big Bang Theory is a TV show, but it is also part of the study of Cosmology. Have you ever wondered about the origin and evolution of the universe? This presentation on the history and recent developments of modern cosmology will introduce students to the scientific study of the large scale properties of the universe as a whole. Learn more about this interesting area of scientific study that involves the fields of physics and astrophysics.

S-32

The Art and Science Connection - Walking the Line Between Art and Technology

John Arnold, Artist / Educator

Where is the line between art and technology? Artists and scientists have more in common than most people think. We will explore new, unexpected ways art and science are connected including emerging technologies such as quantum computing and ultra high speed photography. Also, we'll look back to some significant moments in the history of art/science connections.

S-33

Tours of the Department of Chemical and Biological Engineering

Dr. Mark T. Swihart, UB Distinguished Professor, Executive Director, NYS Center of Excellence in Materials Informatics, University at Buffalo

Learn how chemical engineering research is advancing the development and production of new materials for next generation batteries, solar cells, and other cutting-edge applications that will shape the future. Visit the research laboratories where these new materials and processes are being developed and tested, and the teaching laboratories where UB students learn the chemical engineering principles underlying these technologies and similar cutting-edge biological engineering advances like the growth of artificial tissues and organs. You won't want to miss the exciting hands on demonstration of the power of chemical reactions at the end of the tour!

S-34

Engineers for a Sustainable World

Hailie Suk, University at Buffalo

Learn about the major issues regarding clean water and areas that are impacted by a lack of clean water. This presentation will focus on the steps of water treatment. Student groups will have an opportunity to construct their own water filtration systems. Interact with these UB engineering students, while you learn about steps you can take to help the environment.



Large Group Presentations (L)

(These presentations will be assigned to students)

L-1 Endangered Species & C.I.T.E.S. Trade in Wildlife

Michael Muehlbauer, Supervisory Wildlife Inspector for Upstate New York, U.S. Fish and Wildlife Service, Office of Law Enforcement

The importation and exportation of wildlife and endangered species is regulated by the USFWS's law enforcement. Buffalo is an international border port where inspectors are responsible for monitoring the international wildlife trade. A video, PowerPoint and display materials will add to this session.

L-2 The Real Science Behind CSI: Applied Forensic Science

Dr. Ted Yeshion, Professor, Department of Criminal Justice & Criminalistics, Gannon University

An overview of a typical crime laboratory and the responsibilities for each section will be explored. With a focus on evidence, discussions will include a definition of forensic science, Locard's Exchange Principle, how different scientific disciplines integrate to assist investigators in resolving inquiries of a legal nature, and the importance of crime scene reconstruction. The role of the forensic scientist as an expert witness will also be discussed.

L-3 A Sexually Transmitted Infections: The Gift that Keeps Giving

Beverly Roe, Professor, Erie Community College, South Campus

This informative program will provide an overview of both the common and uncommon sexually transmitted infections that young adults should be aware of.

L-4 Penguins: Some like it Hot!

Autumn Syracuse, Aquarium Educator, Aquarium of Niagara

When you think about penguins, you probably imagine a black and white bird waddling through the ice and snow. At the Aquarium of Niagara, our Humboldt penguins prefer the warm climate found along the coast of Peru. We will discuss the differences and similarities between several different species of penguins, and then dive right in to the cold waters of Peru to learn more about Humboldt penguins. Hear facts and funny tales of these birds that call the Aquarium of Niagara home.

L-5 The Perils of Plastic

Dr. "Sam" Sherri A. Mason, Professor of Chemistry, Chair, Department of Geology and Environmental Sciences, The State University of New York at Fredonia

PLASTIC: the material of our age. Survey a day in your life and you will realize just how prominent it is. What is this material and what happens to it? Learn more about plastics and their fate, especially since we are increasingly finding these materials in our water. Freshwater plastic pollution is a relatively new research area, though one that is especially important considering our reliance on water for life. This presentation will provide an overview of the research work that has been done to-date, focusing upon the Great Lakes, its tributaries and food web.

L-6 Environmental Chemistry in Our Community: The Role of Students and Cooperation

Dr. Joseph Gardella, Jr., SUNY Distinguished Professor and John and Frances Larkin Professor of Chemistry, University at Buffalo

Over the past 20 years, collaborations between UB students, community members, government and industry have all worked to answer questions about pollution in local environments. A review of experiences in working in Buffalo and Tonawanda in Erie County and Lewiston/Porter in Niagara County will be presented as case studies. The ability of the community to understand and participate in the planning, execution and interpretation of scientific results improves the way we deal with environmental issues.

Tips For Making the Most of Science Exploration Day:

- 1 Campus guides, wearing bright SED vests, are located throughout the halls and buildings. They have volunteered to spend the day keeping you from getting lost. Don't hesitate to ask for directions!
- 2 Move quickly to your next presentation location. In some cases you will need to move across several buildings to get where you need to be, so you can't just hang around. Keep moving!
- 3 If you signed up for any tour, your schedule card will include a color. That color will match a sign hanging from the ceiling in Capen Hall, near the SED registration table. Stand under, or as near as possible to, that sign so you will not miss the tour start.
- 4 You must follow the schedule assigned to you. Attendance for each session is closely monitored.
- 5 All presenters, guides and SED Committee Members are volunteers, so please treat them with the respect and appreciation they deserve. They are taking part because they want you to learn as much as possible at SED.
- 6 Remember, you are representing your school and teachers. Please do not interrupt or disturb the presentations with inappropriate behavior.
- 7 Ask questions and be engaged in the presentations. The presenters are trying to provide you with informative sessions.
- 8 Please share comments both positive and negative about SED and specific presentations. Your teachers will be asked to share your responses with our Evaluation Committee.
- 9 Have fun and enjoy learning about different scientific fields and the research being conducted by the scientists you are interacting with!



Science Exploration Day Committee

The following individuals have generously volunteered their time and efforts to make SED a reality:

Dr. Jeff Arnold

Director, Teacher Leadership Quality Partnership (TLQP)
Project, Daemen College

John Arnold

Artist/Educator

Suzanne Chamberlain

Senior Director, Office of Vice President for Research
and Economic Development, University at Buffalo

Joseph Cozzarin

Teacher, Buffalo City Honors School (Retired)

Helen Domske

Associate Director, Great Lakes Program, UB;
Sr. Extension Associate, NY Sea Grant

Bruce Donn

Teacher, Kenmore East High School (Retired)

Dr. Rodney Doran

Professor of Science Education, University at Buffalo (Retired)

Barbara Jeziorski,

Williamsville South High School (Retired)

Dr. Kenneth Licata

Teacher, Williamsville South High School (Retired)

Kelly Mergler

Science Teacher, Cleveland Hill High School

Donald Pearce

University at Buffalo School of Medicine

Paul T. Ruda

Teacher, Cleveland Hill Schools (Retired)

Len Weiss

Teacher, Cleveland Hill Schools (Retired)

Cathy Zawodzinski

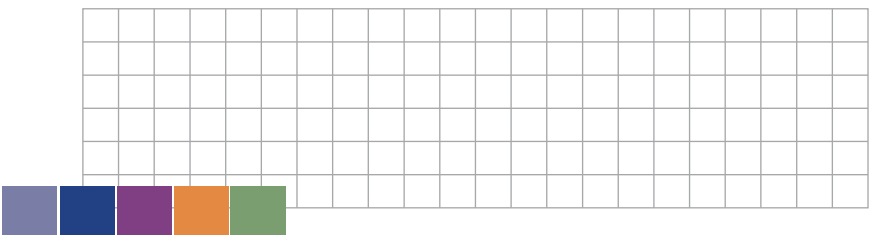
Teacher Leadership Quality Partnership (TLQP) Project,
Administrative Assistant, Daemen College



The 2017 Distinguished Service Award

Dr. Joe Nickell has been a mainstay among the presenters and supporters of Science Exploration Day since his arrival in Buffalo over twenty years ago. He is apparently the only full-time scientific investigator of paranormal claims in the world and is definitely the world's foremost practitioner, with a home base near the University at Buffalo at The Center for Inquiry. He began his career with investigations of document forgery and the book he wrote on the subject and his background as a stage magician at the Houdini Hall of Fame and as a private investigator led him into the field of paranormal claims. Joe has travelled the world doing investigations and writing about them in the several dozen books and innumerable articles in *The Skeptical Inquirer* and elsewhere that he has authored.

It is our good fortune that Joe Nickell views paranormal claims as teaching and learning opportunities because his accounts have intrigued students in the many workshops he has presented at Science Exploration Day since the mid-'90s. Investigating the Shroud of Turin, pursuing reports of hauntings, validating treasured documents and autographs, and exposing some forgeries are all in a day's (or life's) work for Joe Nickell and we are pleased to recognize his ongoing contribution to our program.



Wednesday, March 22, 2017
University at Buffalo, Amherst Campus

First Lunch SCHEDULE

First Session	9:15am - 10:00am
Second Session	10:10am - 10:55am
Lunch*	11:05am - 11:25pm
Large Group	11:25am - 12:10pm
Fourth Session	12:20pm - 1:05pm

Second Lunch SCHEDULE

First Session	9:15am - 10:00am
Second Session	10:10am - 10:55am
Large Group	11:05am - 11:50pm
Lunch*	11:50am - 12:10pm
Fourth Session	12:20pm - 1:05pm

* Bag lunches are strongly recommended!

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