

SCIENCE *exploration* DAY

scienceexplorationday.com **BUFFALO**



Wednesday, March 16, 2016 • University at Buffalo, Amherst Campus

Featuring Keynote Speaker:
Bill Owens, Praxair
The Cold, Cold World of Cryogenics

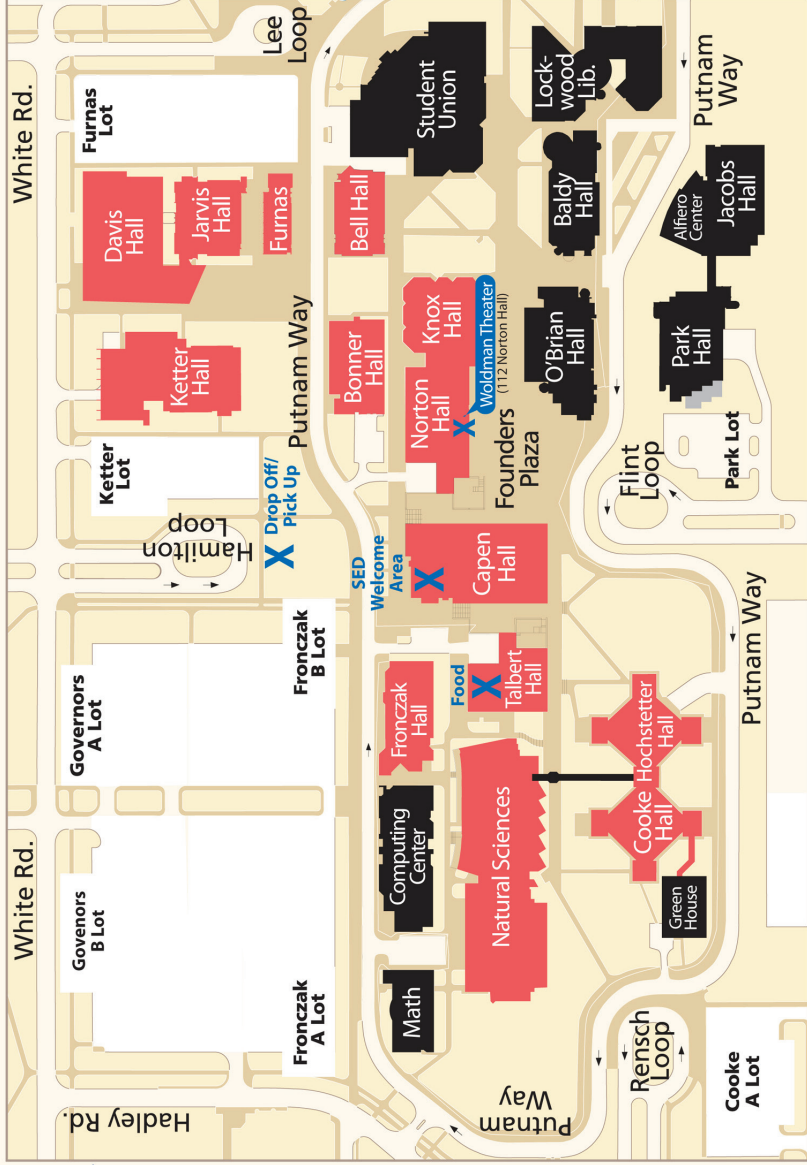


Niagara Frontier
Science Supervisors

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

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

Courtney Benson, 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

Tour of the Geology Department Research Laboratories

*Susan Bratcher, Instructional Support Technician, Lab Coordinator,
Department of Geology, University at Buffalo*

The Geology Department is involved with exploring volcanoes on Mars, cleaning the local groundwater supply, studying coral reefs, understanding volcanic processes and much more. This session includes tours of the department's research laboratories. Students will learn about ongoing research activities in the geological sciences area, including state-of-the-art instrumentation.

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 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!

Stacy Furgal, Fish Biologist, U.S. Fish & Wildlife Service

Below the surface of the Great Lakes, an entirely different world awaits you. Plankton drifts at the mercy of the lake's currents, fish compete for survival, and the ecosystem itself is in flux after being invaded by creatures from the other side of the globe. Learn about the exciting science happening on and off the water first-hand from a fish biologist who once lived on a research vessel as it traveled the span of Lake Ontario. 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

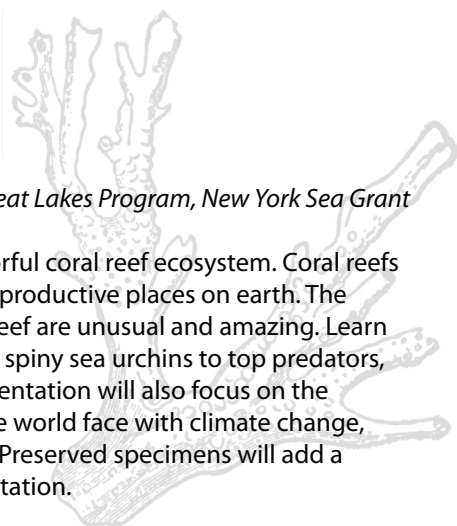
Finding their way around the night sky via a portable planetarium, participants will observe projections of constellations, stars and galaxies and learn more about the nature of the universe.

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 Motion Simulation Laboratory (MSL)

Dr. Kevin F. Hulme, Senior Research Associate Center for Applied Simulation and Engineering Design, University at Buffalo

Tour our Motion Simulation facilities where students will be introduced to applied simulation technologies that support research in vehicle and transportation design, and in the entertainment industry. Our laboratories foster partnerships both with Academia and Industry in Western New York, and are also used for clinical applications, and for education and workforce training. Our SimCUBE simulator provides a fixed-base (motion-free) simulation capability located within a 4-screen surround visualization container. Our SimRING driving simulator is comprised of a motion-based platform (donated by Moog), a Ford Contour passenger cabin (and driver controls), a sound system, and a 360 degree immersive theater that provides participants with a fully surround field-of-view.

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 of 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

Deborah Piotrowski, Lab Assistant - Adjunct Instructor, Medaille College

With the help of a Guiding Eyes Dog in training, you will learn general animal health information about what it takes to care for four-legged patients. This presentation will shed light on the exciting and rewarding work of a Licensed Veterinary Technician.

Using a discussion and demonstration, you can learn some emergency first aid and CPR measures that all pet owners should know. If you have pets or love animals, this presentation should not be missed.

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. David Watson, Associate Professor Department of Chemistry,
University of Buffalo*

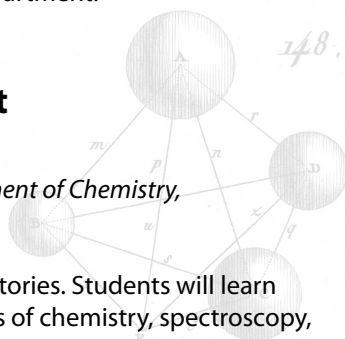
This session includes tours of research laboratories. Students will learn about ongoing research activities in the areas of chemistry, spectroscopy, and nanotechnology, including state-of-the art instrumentation.

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

Dr. Paul Vanouse, University at Buffalo and Dr. Sandra Small, New York State Center of Excellence in Bioinformatics and Life Sciences

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, Edinboro University of Pennsylvania
Professor of Forensic Science
Department of Political Science and Criminal Justice*

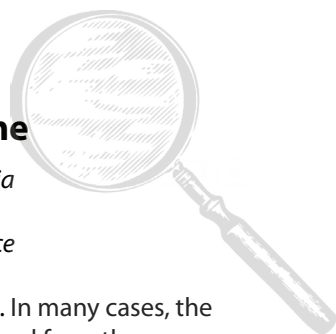
Crimes of violence frequently involve bloodshed. In many cases, the perpetrator has an opportunity to wash away blood from the scene. Luminol is an extremely sensitive presumptive blood test that can detect trace amounts of blood invisible to the naked eye. This presentation will introduce the student 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

Insight Into Physics Department Research

*Dr. Doreen Wacheroth, Professor, Associate Department Chair,
Department of Physics, University at Buffalo*

In this non-traditional "tour" of Physics Department research, students will learn about UB's high-energy physics group and their work at the CERN Large Hadron Collider in Geneva, Switzerland. UB's involvement in the discovery of the Higgs particle will be the focus of this discussion that will be highlighted by images, video clips and interaction with UB students who will share their research experience at Fermilab.



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

Tour of Biological Sciences Department Research Laboratories

*Dr. Laura Rusche and Dr. Michael Yu, Professors, Department of Biological
Sciences, University of Buffalo*

The Department of Biological Sciences is a vital hub of biological research and learning activity. Students will learn about ongoing research activities, touring departmental laboratories, as well as having opportunities to ask questions about getting a degree in the Biological Sciences Department.

S-24

Wolves - Helping to Restore The Balance of Nature

Joseph Allen, Adjunct Professor University of Buffalo

When gray wolves were reintroduced into Yellowstone National Park in 1996, no one anticipated the degree of ecological benefits that were to come out of the presence of this apex predator in a land bereft of wolves for over 70 years. From prey reduction, browse renewal, stream and river bank rejuvenation, the return of ancillary species and wild behaviors, to a "balancing" of the complex food pyramid, wolves have been an unmitigating benefit to the Greater Yellowstone Ecosystem as well as the northern Rockies. The reintroduction of this apex predator has arguably been one of the greatest stories in conservation history.

S-25

Tropical Life and Death: The Devonian Fossils of Western New York

Sarah Einhouse and Phil Stokes, Penn Dixie

Three hundred and eighty million years ago, WNY was a very different place. The region was a shallow marine environment that hosted many exotic, and now extinct, organisms. Trilobites, corals, crinoids, fish, and others ruled these seas, while plants and the first amphibians burst onto the relatively barren land. It all came to an end approximately 360 million years ago, as environmental changes triggered one of the Earth's five largest extinction events. Globally, at least 75% of all species had disappeared by the end of the Devonian. We'll discuss all of this and more in an interactive presentation where participants will have the opportunity to identify and keep their own Devonian fossil.

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 some of these unusual weather events and tools and tips to work with severe weather.

S-29

The Air Around You!

Dr. John D. Atkinson, Assistant Professor, Civil, Structural and Environmental Engineering, University at Buffalo

Take a breath and learn about the air around you in WNY and how toxic chemicals, smog, particles, and acid rain can impact your life. The presentation will address the legacy of industrial air pollution and current issues. The goal of this lively discussion is to provide need-to-know information about how air pollution in WNY has changed and what you can do to help keep yourself safe.

S-30

Conduct a Failure Analysis of Solar Cells in UB's Materials Characterization Laboratory

Dr. Zongmin (Shirley) Bei, Senior Research Support Specialist, Shared Instrumentation Laboratories, School of Engineering and Applied Sciences, University at Buffalo

Solar cells are the popular technology to convert sunlight into electricity. But some of them cannot work properly even if they look perfect to the naked eyes. A process to explore the causes or factors of such malfunctions is called failure analysis. In this session, we are happy to demonstrate how to find the "killers" of our solar cell chips by using the powerful atomic force microscope (AFM) in our Materials Characterization Laboratory. You are also welcome to join the failure exploration!

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 about exciting chemical engineering research in the cutting-edge fields of nanoscale materials and computational science and engineering. Visit laboratories where biochemical and biomedical engineering research is conducted to study complex biological systems at scales from molecules, to individual cells, to tissues, to organs.

S-34

Engineers for a Sustainable World

Hailie Suk and Olivia Licata, University at Buffalo

Learn about engineering with this innovative session that includes sampling smoothies made from their Solar Smoothie Cart. Interact with these UB engineering students who are doing their part for sustainability, 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 the 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 agency. Buffalo is an international border port where inspectors are responsible for monitoring the international wildlife trade in commercial products. A video, PowerPoint and display materials will add to this session.

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

*Dr. Ted Yeshion, Edinboro University of Pennsylvania,
Professor of Forensic Science, Department of Political Science and
Criminal Justice*

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 are “COOL” Birds!

Jeanette Brunner, Educator, Aquarium of Niagara Falls

This presentation will focus on some of the 17 species of penguins that live in the Southern Hemisphere. From the 4' tall Emperor to the small Little Blue penguins, this program will highlight the biology and natural history of these interesting birds.

L-5 Medical Entomology In Service to the Public

*Dr. Wayne Gall, Regional Entomologist,
NYS Department of Health, Buffalo*

Dr. Gall will draw upon case studies, surveillance and his research as Regional Entomologist with the New York State Department of Health to demonstrate how the work of medical entomologists benefits the public and helps protect public health. Deer ticks, bed bugs, fly larvae that invade living tissue, and tropical rat mite dermatitis will be discussed.

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

A collaboration of UB students, community members, government and industry have all worked to answer questions about pollution in local environments. A review of efforts in three Buffalo neighborhoods will be given, including Hickory Woods and Seneca Babcock, along with successes in citizen design of cleanups on East Ferry. A review of the Niagara County community of Lewiston Porter project will also be given. 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

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)

Debra Kieliszek

Science Teacher, Cleveland Hill High School

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



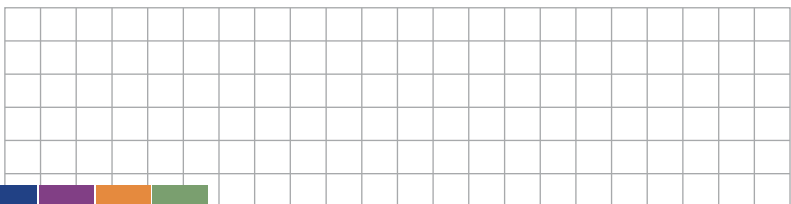
The 2016 Distinguished Service Award

Dr. Jennifer L. Zirnheld, Director and Associate Professor - Energy Systems Integration in the School of Engineering and Applied Sciences, has supported Science Exploration Day from her early days as a professor at the University of Buffalo. Her lively and interactive tours of the Electrical Engineering laboratories receive praise from teachers and students alike. When Dr. Zirnheld meets her groups with a smile and warm welcome, they know they are going to have an enjoyable and educational SED experience.

Dr. Zirnheld's research in the department focuses on the use of electrical engineering innovations in fighting cancer. Her work has been supported through grants, contracts and fellowships from industry and government alike.

Recently named one of 100 Inspiring Women in STEM by INSIGHT into Diversity, Dr. Zirnheld earned this award for her efforts in encouraging the next generation of women to consider careers in science, technology, engineering and math (STEM). Her involvement in Science Exploration Day exemplifies her support of STEM projects throughout Western New York.

Along with her strong research capabilities, Dr. Zirnheld is respected for her teaching and mentoring at the University. She has won numerous teaching honors, including the UB Faculty Award for Excellence in Mentoring Undergraduate Research and Creative Activity, the Institute of Electrical and Electronics Engineers Outstanding Teaching Award, UB Tau Beta Pi Engineering Honor Society Professor of the Year, the UB Alumni Association, Dr. Richard T. Sarkin Award for Excellence in Teaching, and the UB Student Association Milton Plesur Excellence in Teaching Award.



Wednesday, March 16, 2016
 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!

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


 Graduate School of Education
 University at Buffalo The State University of New York