SCIENCE *exploration* DAY

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Wednesday, March 20, 2019 • University at Buffalo, Amherst Campus

Featuring Keynote Speaker:

Dr. Ted Yeshion, Gannon University

The Real Science Behind CSI

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

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State University of New York at Buffalo (North Campus)

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Keynote Presentation

All students and teachers will attend this presentation

The Real Science Behind CSI: Applied Forensic Science

Presented by:

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, 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.

Small Group Presentations (S)

S-1
Wonderful Watersheds!

Kristen Guadagno; Vicki Haas; Mary MacSwan:
Erie County Environment & Planning

Western New York has many wonderful watersheds and you can actively learn how Erie County's Habitat Restoration Program works to keep these areas healthy using environmental education. Part of this session will showcase the hands-on Enviroscape® Watershed Model to demonstrate typical sources of stormwater pollution and solutions to prevent it. The second part will focus on restoration sites, such as Red Jacket Park, Seneca Bluffs, Times Beach and others. Learn about the importance of educating and engaging the local community in active stewardship at the sites to ensure restoration success.

S-2
Science in Your Life
(That you probably never think about!)

Dr. Don Birdd, 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

Students from Neuroscience Graduate Student Association (NGSA),
University at Buffalo

Come join UB's Neuroscience Graduate Student Association in learning about the brain through hands-on activities. Students will learn about the inner workings of human senses such as taste, smell, and sound in addition to the complexities of head injury and addiction. Knowledge gained through these activities are the building blocks for tomorrow's discoveries and we hope you you'll enjoy learning about the brain as much as we do.

S-4
Using Motion Capture in Engineering

Charuvahan Adhivarahan, University at Buffalo

Learn about new technologies in engineering with this session demonstrating how motion capture technology (similar to the Kinect gaming system, but more precise) is used in AI (Artificial Intelligence) controlled UAVs (Unmanned Aerial Vehicles) and ground robots, as well as understanding how the human body moves (biomechanics).

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

Betsy Trometer, Fish Biologist, U.S. Fish & 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
Tour the Motion Simulation Laboratory (MSL)

Dr. Kevin F. Hulme, Senior Research Associate, Shared Instrumentation Laboratories, University at Buffalo

The Motion Simulation Laboratory (MSL), located in Furnas Hall, Room 106 is ideally suited for activities relevant to education and training, experiential learning, sponsored research, industrial collaboration, and workforce development. In this presentation, Dr. Kevin Hulme will offer a high-level introduction to Modeling & Simulation (M&S) technologies, and he will cover the essential theoretical underpinnings of game-based simulator environment creation. Subtopics will include: a brief history of applied simulation, simulator design elements (hardware and software), physics-based modeling, past and present research applications using the driving simulator, and future avenues of research relevant to game-based training (including Oculus VR). Likewise, the presentation will focus on similar elements of motion-based simulation that are currently implemented, with great impact, within the entertainment industry (e.g., amusement ride simulators and theme park engineering).

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., Associate Professor, 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)

Donald Goralski, Director, Shared Instrumentation Laboratories, School of Engineering and Applied Sciences, University at Buffalo

Tour our Digital Manufacturing Laboratory to learn about the basics of 3D printing (A.K.A. Additive Manufacturing)! The DML is home to a high-definition 3D digital scanner 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 3D parts. Among other things, the lab serves as a resource for student class and club projects, academic research, and extra-curricular "Tinkering". 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, Department 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 Professors, Department of 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
ATG**C** Your DNA

Dr. Sandra K. Small, Science Education Manager, Business & Entrepreneur Partnerships, University at Buffalo

Have you ever seen your own DNA? This interesting program will have students participate in an activity to extract DNA from their cheek cells as an interactive way to learn about the fascinating science of DNA. Students will then be able to take their own DNA home in a keepsake necklace!

S-16
Electrical Engineering - Interactive Tour With Hands-on Participation

Dr. Jennifer Zirnheld, Electrical Engineering, University at Buffalo, and departmental colleagues

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 demonstrations within several of the research laboratories in the Electrical Engineering Department.

S-17
Tour of Chemistry Department Research Laboratories

Dr. Timothy R. Cook, and Dr. David C. Lacy, Assistant Professors, 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, Dr. Sandra Small, Science Education Manager and Dr. Solon Morse, Genome, Environment and Microbiome Community of Excellence, University at Buffalo

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
SMART (Sustainable Manufacturing and Advanced Robotic Technologies) Automation Sandbox

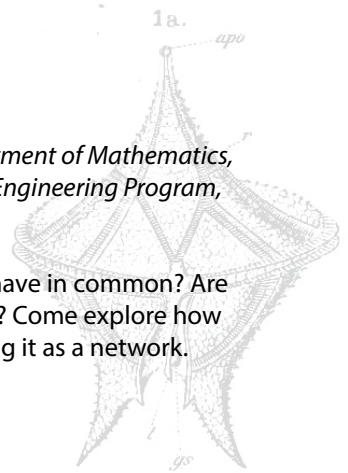
Hemanth Manjunatha, University at Buffalo

Have you ever wondered about robotic arm technologies? Here's your opportunity to see interesting demonstrations of the UR3, Baxter Robot and take part in a hands-on activity with Phantom X Robot arm. Learn about this futuristic technology that's being used at the University of Buffalo today.

S-21
Tour of the Physics Department Research Laboratories

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

In this non-traditional "tour" of the 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
It's All a Network!

Dr. Sarah F. Muldoon, Assistant Professor Department of Mathematics, Computational and Data-Enabled Science and Engineering Program, University at Buffalo

What do social networks and brain networks have in common? Are two of my friends also friends with each other? Come explore how we can better understand the world by viewing it as a network.

S-23
The WILD Side of Western New York

Kristen Rosenburg, 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-24
Breast Cancer Genetic Screening Simulation

Dr. Adam E. Kisailus, Assistant Dean for Internships and Education Outreach, Department of Educational Affairs, Roswell Park Cancer Institute

Participants interested in pursuing the medical and research profession will immerse themselves in the role of a clinical geneticist and learn about the process of screening for hereditary cancer mutations. They will learn about and create a pedigree to translate a fictional character's narrative on a familial history of breast cancer. Using this information and National Cancer Center Network Guidelines students will determine if gene screening should be done and use molecular techniques including DNA gel electrophoresis to determine if the fictional character or her sister possesses the familial genetic mutation for breast cancer.

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, Meteorologist in Charge, 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
Cosmology – The Real Big 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-31
Science and Art Meet on the Moon

John Arnold, Artist / Educator

Putting a city on the moon means putting art and culture on the moon. From art in hotel lobbies to local crafts and souvenirs, the moon, like an Olympic village, will have its own visual style and distinctive architecture. We'll take a look at the in-depth scientific research Andy Weir did for his new book ***'Artemis'*** and imagine how science will shape the art and design of the first lunar civilization.

S-32
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-33
Engineers for a Sustainable World

Austin Izzo, Graduate Student, Engineers for a Sustainable World (EWSUB), 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 division. 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 3D Printing, Robots, and Buildings

Susan Witt, STEM Lab Manager, Buffalo Manufacturing Works and Dr. Ken English, Deputy Director, Sustainable Manufacturing and Advanced Robotic Technologies Community of Excellence (SMART CoE)

What is Additive Manufacturing and how do 3D printers and robots work together to create new designs from game controllers to buildings? During this session, you will learn about additive manufacturing 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.

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

Beverly Roe PhD, Professor/Biology Department Chair, Erie Community College

This informative program will provide an overview of both the common and uncommon sexually transmitted infections that young adults should be aware of. PLEASE NOTE: Material presented in this lecture is sexually explicit and may be of concern to some students and/or their parents. If that is the case, a student should notify their teacher immediately and every effort will be made to prevent that student's attendance at this presentation.

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 A Talk on the Wildside

Educator from Hawk Creek Wildlife Center

Hawk Creek Wildlife Center will bring nature up-close with a demonstration featuring some of their resident animals. A bird of prey flight demonstration will help teach students about these amazing predators.

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 presentions 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
Daemen College (Retired)

Joseph Cozzarin
Teacher, Buffalo City Honors School (Retired)

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

Dr. Rodney Doran
Professor of Science Education, University at Buffalo (Retired)

Barbara Jeziorski,
Teacher, Williamsville South High School (Retired)

Dr. Kenneth Licata
Teacher, Williamsville South High School (Retired)

Donald Pearce
University at Buffalo School of Medicine (Retired)

Paul T. Ruda
Teacher, Cleveland Hill Schools (Retired)

Catherine Sedota
Daemen College

Dr. Sandra Small
Science Education Manager, University at Buffalo

Dr. Noemi Waight
Professor of Science Education, University at Buffalo

Gail Zichittella
Teacher, Cheektowaga Central Schools (Retired)

The 2019 Distinguished Service Award

Helen Domske

The Science Exploration Day organizing committee is pleased to honor Helen Domske for her longtime leadership in recruiting, contacting, and scheduling the presenters for this annual event. Helen was the Curator of Education at the Aquarium of Niagara Falls for fourteen years before serving the past twenty-five years as the Education Coordinator for New York Sea Grant and the Associate Director of the Great Lakes Program at the University at Buffalo. She is the "go to" expert in Western New York on fisheries, biodiversity, invasive species, and microplastics in the waters.

A popular workshop presenter, Helen has taught more than 50,000 students in grades 4-12 throughout her career. Helen has been recognized by the Science Teachers Association of New York State – Western Section, the International Association of Great Lakes Research, the Buffalo Audubon Society, WNY Science Congress, and the Buffalo Museum of Science. Helen Domske's contributions to Science Exploration Day cannot be overstated and we wish her all the best on her continuing journey.

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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
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Western Section of the Science Teachers Association of New York State

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