

# Nebraska Science News



Nebraska Academy of Sciences



Nebraska Association of Teachers of Science

***Serving Scientists and Science Educators Across the State of Nebraska***

Spring, 2014-2015

Volume 18, No. 3

*Published by the Nebraska Academy of Sciences*

## FROM THE NAS PRESIDENTS' DESK

As noted in this newsletter, April 17th will be the 125th annual meeting for the Academy. I look forward to interacting with the researchers sharing their progress and findings, as well as meeting with individuals who comprise the network of scientists and science advocates throughout our state. I am pleased that two members of the UNMC Ebola Response Team, Dr. Shawn Gibbs and Shelly Schwedhelm, will deliver the Maiben Lecture to our participants.

Please register and attend this year. Also, thanks to the work of past-president and Nominating Committee Chair Dr. David Peitz, we have a slate of candidates for our organization's leadership positions up for election. Please vote and submit your ballot prior to the annual meeting.

January 30th we celebrated the 135th anniversary of the founding the Nebraska Academy of Sciences with an email sent to all recent members, even if the membership has lapsed. The intent is to provide helpful and informative news and links that both members and non-members will find valuable. With the goals of the Academy to promote, stimulate and encourage science throughout the state, we invite you to share your ideas, news of recent publications, and upcoming events.

Along with NJAS President, Aurietha Hoelsing, and the Nebraska delegate to AAAS, Dr. Chris Schaben, I had the pleasure of representing the Academy at the AAAS Annual Meeting and AJAS Conference in San Jose, California, in mid-February. Led by AJAS President Lee Brogie and National Association of Academies of Science Executive Director Ed Brogie of Nebraska, the American Junior Academy of Sciences Conference is held in conjunction

with the AAAS Annual Meeting. Eight of the Top 10 student projects from the 2014 NJAS Senior Division participated this year. By coincidence, all 8 participants graduated from high school last spring, so they reunited as first-year college students from UNK, Doane, Wayne State, UNL, Nebraska Wesleyan, Iowa State, Illinois College, and Michigan's Hillsdale College. Congratulations to these students for presenting posters and oral presentations and interacting with AAAS scientists, secondary students and other first-year college students from 17 other state Academies.

For me, the highlight of the 5 days in San Jose was chaperoning a student field trip to the Computer History Museum and to Google where Google's "Chief Internet Evangelist" Vint Cert, "The Father of the Internet" spoke with students for over 90 minutes. Dr. Cert's contributions continue, as his universal vision and expertise lead to more innovation. He shared his current work with the "sensor environment," space exploration, thwarting hackers, TV whitespace, and Google X. His advice for students included: take risks, even if you fail because "failure is good"; and look at the outliers in your data and investigate why they happen; and be alert to opportunities that you haven't planned for.

On other field trips, Nebraska's students visited Berkeley Lab and the Exploratorium.

The new CEO of AAAS, Dr. Rush Holt, greeted a small group of Nebraska and New Jersey students who remained after a plenary lecture.

Other news of note from San Jose: The current AAAS President, Dr. Gerald Fink of MIT, shared how new imaging is inspiring, but can be threatening to how we understand. He challenged the gathering to enjoy the "lure of unexpected voyages."

AAAS debuted an on-line only spin-off of its renowned journal SCIENCE. While the weekly issues of SCIENCE continue to be available only to AAAS members, ScienceAdvances will feature peer-reviewed articles without requiring a AAAS membership to access. In the first days of the roll out, national media were already reporting on stories from [scienceadvances.org](http://scienceadvances.org).

Sigma Xi and its' journal "American Scientists" recently started publishing a professional refereed journal for pre-collegiate researchers. I encourage middle school and high school teachers to steer your science research classes and science fair entrants to read and to submit papers about their own research to <http://www.chronicleofthenewresearcher.org/>

Congratulations to Lee Brogie who, though busy as a Wayne Middle School teacher and NATS president-elect, was elected to another 3 year term as president of the American Junior Academy of Sciences. Dr. Joan Christian of Beatrice High School was elected as a Teacher delegate to the National Association of Academies of Sciences, and I was elected as a Board Member At Large to the NAAS.

With the annual meeting, continual publication of research through our digital journal TRANSACTIONS, the Nebraska Junior Academy of Sciences' Regional and State Science Fairs, Nebraska Science Festival, National Science Olympiad and the National Congress for Science Education all taking place in our state between now and July, I look forward to joining with you to promote, stimulate and encourage science in our state this year.

Dan Sitzman, NAS President

**135<sup>TH</sup> ANNIVERSARY YEAR  
125<sup>TH</sup> ANNUAL MEETING OF  
THE NEBRASKA ACADEMY  
OF SCIENCES  
APRIL 17, 2015 AT NEBRASKA  
WESLEYAN UNIVERSITY**

Please join us for the 125<sup>th</sup> Annual Meeting of the Nebraska Academy of Sciences. Register now on line at [neacadsci.org/events](http://neacadsci.org/events) or download the form included in this newsletter. Our featured speakers at 11:00 a.m. will be two members of the Ebola team from the University of Nebraska Medical Center, Dr. Shawn Gibbs and Shelly Schwedhelm. Their lecture is entitled "Nebraska Biocontainment Unit Planning and Response to Ebola".

**Shelly Schwedhelm, MSN, RN, NEA-BC**

Executive Director, Emergency Preparedness & Infection Prevention, UNMC

Shelly is currently the Executive Director of Emergency Preparedness which includes the Biocontainment Unit and Infection Prevention at Nebraska Medicine. Prior to her new role, she recently served as Director of the Emergency Department, Trauma Program, and Emergency Preparedness Services.



Shelly attended Methodist School of Nursing where she received her diploma degree in 1982 and her Bachelors of Science degree in Nursing from the University of Nebraska College of Nursing in 1992. Shelly has 33 years of nursing experience. She started her career as an ER nurse/flight nurse at The

Nebraska Medical Center. She served as the Director of Perioperative Services for 15 years. She completed her Masters in Nursing degree from Nebraska Wesleyan University in 2007. She is certified as an Advanced Nurse Executive.

Shelly is actively involved in the Omaha Metropolitan Medical Response System (OMMRS) where she is Chairperson of the Healthcare Coalition Committee and serves on the Steering and Executive Committees.

**Shawn Gibbs, Ph.D**

Shawn Gibbs is a Professor with the University of Nebraska Medical Center's Department of Environmental, Agricultural & Occupational Health in the College of Public Health. He also serves as the Associate Dean for Student Affairs, Director of Prevention/Intervention Core for the Central States Center for Agricultural Safety and Health, and Director of Research for the Nebraska Biocontainment Unit.

Shawn received a B.S. in Biology from The Ohio State University, and both an M.S. in Environmental Engineering and a Ph.D. in Environmental Science from the University of Cincinnati. He received his MBA from University of Nebraska at Lincoln. He became a Certified Industrial Hygienist (CIH) in 2009. Shawn was a US Fulbright Scholar to Egypt in 2006 assisting in programs on bioaerosols and exposure assessment. His previous work experience includes serving as a contract Biologist/Toxicologist for the USEPA, and a research associate and postdoctoral fellow

for Wright State University's Department of Obstetrics and Gynecology, and as an Assistant Professor at the University of Texas Houston School of Public Health.

Shawn has published over seventy peer reviewed papers in his area of research. His research area is industrial hygiene and environmental exposure assessment, focusing on environmental microbiology. This includes source evaluation, source tracking, and methods



to reduce exposure. He is a member of numerous professional organizations, and has served as a reviewer for many peer reviewed journals. Additionally, he has served as grant reviewer for multiple organizations including the USEPA, NIOSH, and Fulbright Commission. He has received funding from DOD, NIH, USEPA, IIE, and others.

As part of the Nebraska Biocontainment Unit, Shawn works with a group to determine policies, procedure, and best practices for use within the Unit. Shawn, along with others, are responsible for industrial hygiene related items within the Nebraska Biocontainment Unit, including but not limited to patient transportation, solid and liquid waste handling and disposal, patient discharge, patient remains, PPE donning and doffing, decontamination, etc.

## **GREETINGS FROM THE NATS PRESIDENT**

Like many of you, I have become more and more intrigued with the Next Generation Science Standards (NGSS) as a pathway to facilitating more students engaging in STEM. According to [www.nsta.org](http://www.nsta.org), the NGSS “aim to eliminate the practice of ‘teaching to the test,’ and instead, “shift the focus from merely memorizing scientific facts to actually doing science.”

Most science teachers I know don't purposely “teach to the test” but many have real reasons for not “doing” science including, but not limited to, lack of resources, large class sizes, outdated lab space, short class periods not conducive to doing experiments and investigations, lack of preparation time, and not enough professional development. The “teach to the test” syndrome seems to be fairly predominant and generally the discussion seems to always contain at least one reference to the state test in

science. Everyone is concerned about scores. So, how do we respond? More review? Practice questions? Practice tests? Sound familiar?

My challenge for each of us this semester and perhaps as we begin to plan for next year, is to find at least one way to engage at least one student or a small group of students in doing real science; answering an original question, testing a hypothesis, building something, engineering or re-engineering something, collecting real-world data, or making observations as part of a larger study. I know that many of you are already doing this and if you are, find someone to mentor through the process. Share your successes and failures with others.

I was inspired to provide an opportunity like this to students at Norfolk High School by starting a small robotics club last school year. Thanks to a collaborative effort from Nucor Corporation, we began the journey of learning about designing/redesigning Lego Mindstorm robots and how to program them. This year we made the jump into competitive VEX robots with help from NPPD. The club only has 5-10 active members at this time and sometimes I wondered if it was worth the extra hours at after school and long Saturdays away from family with no additional pay. However, once we went to an actual competition, I began to understand how activities like this really engage and prepare students for STEM careers.

I didn't fully appreciate the impact competitive robotics has until we finally made it to a competition. The high level of robotic design and engineering blew my mind! Teams of students were busy making last-minute changes, writing programming code, using power tools, testing, re-testing and having a great time at the same time! Students from competing schools interacted with other schools to find out how they could help. Experienced teams jumped right in to help novice teams. A student from Columbus sat down and helped my students from Norfolk write an autonomous program for our robot. Hardly an adult was to be seen.

How does all of this relate to NGSS learning? First, all three dimensions of NGSS are present: practices, crosscutting concepts, and disciplinary core ideas. The robots and the challenges the students must meet become the tool for investigating complex ideas and solving problems. Teamwork and collaboration are keys to success. Math, technical drawing, electronics, science, communication skills, and computer programming are integrated. Inquiry and engineering go hand in hand in robotics.

Before you say, “well, I don't know anything about robotics,” neither did I. It's more about providing the opportunity for the students. They will quickly exceed

most sponsor's level of expertise. How do I know that my student's were engaged? Because, they are already knocking on my door asking if they could start building next year's robot!

I'm not saying that starting a robotics club is the direction that you or your school need to go. I just use it as an example of how engaging students can impact their learning. If you would like to experience robotics for yourself, I encourage you to attend the 4th annual Nebraska VRC State Championship brought to you by the CREATE Foundation and ASME and hosted by Cross County Community Schools to be held February 20-21. Cross County Community Schools are located between Benedict and Stromsburg. Also, middle school educators could also attend the CREATE U.S. Open Robotics VEX Middle School Division Championship to be held at the Kroc Center in Omaha, April 3-5. Bring an administrator and/or community leader and start the discussion of starting a team!

Finally, if professional development is holding you or a colleague back, consider joining us for the annual NATS Fall Conference. The dates will be September 24-26 and the conference will be held at Camp Calvin Crest. We have been assured by the camp director that they have made considerable improvements to the wifi capacity so internet access should no longer be an issue. Your new President-elect, Lee Brogie, the NATS board, and myself are moving forward with planning an excellent conference. After having been to the NSTA National Conference, I personally believe that the professional development that is offered at NATS is just as good, if not better! If you haven't "liked" NATS on Facebook, please do so! I'll send a free NATS t-shirt to the 200th "like."

Finally, this is a great year to be involved with science in Nebraska. The state Science Olympiad competition will be held April 25 followed by the National Science Olympiad May 15-16. The Nebraska State Science Fair competition will take place April 17 at Nebraska Wesleyan University. Judges and volunteers are still needed!

Joe Myers, NATS President



The following contains a summary of an article in **Science** magazine, April 19, 2013, pages 314-317: "Outside the Pipeline: Reimagining Science Education for Nonscientists" by Noah Weeth Feinstein, Sue Allen and Edgar Jenkins. We recommend it.

## **"Science is a refinement of everyday thinking" A Science Elite Must Be Supported By a Science Savvy Society**

**It is a truism** that scientists have made a tremendous contribution to civilization, and that such a contribution has been most evident in societies that understand and support the scientific elite. Whether it be the Greeks supporting Archimedes, the Americans (and previously the Nazis) supporting the rocketry of Dr. Werner Von Braun, or the Capitalist Revolution in Britain providing a basis for the inventions and principles of the Industrial Revolution – we could go on and on- scientific achievement has thrived to the degree it is valued for its contribution and to the degree that its methods are respected.

For that reason, especially since Sputnik, the call for science literacy and enhancement of relevant math skills has gone out in every advanced society. Just as we realize that while we want a society where anyone can be President, we also realize that not everyone will be President, and not everyone will be a scientist by vocation. But the question here is, "are we giving science and scientists the honor, respect and support they deserve?" To answer that, we must carefully consider all of the elements of the current social milieu.

For one thing, the everyday understanding of science by the average person is diluted and confused by a media which takes potential discoveries out of context, distorting their validity and meaning. Research is more and more often filtered through ideological, religious and political mindsets. Stick around long enough, and the health advice that was once considered basic truth will be tossed aside, often to support a completely contradictory claim. Science is so contingent!

In addition, when lay people need access to scientific knowledge, they often do not remember or rely on knowledge they learned in school. Let's also admit that there would be more scientists today if institutions of higher learning were more inviting to them. To quote the authors directly, "there are many different 'publics' for science, each with different concerns and resources for making sense of the world."

Science is not one thing. It is not one methodology. And it does not provide absolute truth. All this is confusing for many people. Forensic science does not allow for as much experimentation as biological since. Weather provides an incredible mass of information for a system of thinking based on measurable observation. People often fail to see the value of models; they just want a concrete answer or prediction on which they can rely. One discrepancy and they lose faith...

Most lay people are interested in science only for its immediate problem solving qualities. They may become impatient for theory, just wanting “an answer”. But therein lays the “hook” to get non-scientists more deeply involved and appreciative of scientific endeavor. To get “the answer” or, at least a better answer, they must develop research skills, checking out information from a variety of sources and evaluating that information. In that sense, lay science, problem solving, is much like researching health insurance alternatives or models of automobiles. Are we helping our students to knowledge about where to find that information, and determining what is usually most reliable? Are we encouraging them to do a better job of what they are going to do anyway, which is to develop their own intellectual constructions of what science means and can do for them? Are we helping them discover the immense practical value of systematic investigation?

**This isn't the 1690's.** People may still panic about sensational news, but they have some ability today to put events into context, to evaluate sources of information, to recognize that when science isn't absolutely right or the complete solution to their problem that doesn't mean it is a failure to be abandoned. We don't have witch trials anymore, but we still have much we can do to improve our lay science acceptance and understanding of what scientists do and try to do. How exactly can we improve? The authors recommend, among other things, something called Problem-Based Learning. This is an approach that mirrors how we need to use science out of the classroom, and in later life. It is no simple fad, it was developed in medical school and it helps the student learn to apply the theoretical in new and practical ways. This is a new approach, one that will require a great deal of training and preparation, but one that has a practical basis and which is compatible with experimentation. It has potential for use in math and in bringing math closer to science.

If nonscientists are to research and evaluate science information, how do they do it? Are they trained specifically to evaluate their sources, recognize when data is being “packaged” to sell a product, or to find alternative sources that will help them temper their natural human tendencies to jump to conclusions? Which sources are most trustworthy? Which anecdotal reports can one take seriously? How long should one suspend judgment? Is there value in further research even after a conclusion is accepted and a decision is made? What does one make of inconsistent results or contradictory claims? Do students get this kind of training in the classroom, or do they have to go out in the world, like Tom and Huck, before they gain some real skills, if ever?

Students hate lectures. We can increase their involvement through science cafes, participatory science games,

constructivist activities, even the old-fashioned-but-potentially-effective science clubs if they can be made to draw in non-science students. We can do the latter by helping non-science students develop personally meaningful science interests or recognize problems they want to solve.

What can we do as teachers? We can start to research these things, find sources, discuss options, convince (good luck) administrators to let us try a few things. Students can eventually assist us.

Recently a group of students formed in suburban Omaha to protest the model of school as a place where students shuffle from class to class in a stupor, or staring at their devices. It has to be more than that. Once students realize you're on to something, they'll support you. And, eventually, they will support science and respect scientists-in-training.

Keep thinking of these three challenges outlined by the authors above: We need to:

- “Help students explore the personal relevance of science and integrate scientific knowledge into complex practical solutions”.
- “Develop students’ understanding of the social and institutional basis of scientific credibility”.
- “Enable students to build on their own enduring, science-related interests”- even if they never formally become scientists.

Aurietha M. Hoelsing, President/State Coordinator  
Nebraska Junior Academy of Sciences

## ACADEMY WEB SITE UPDATES

The NAS/NATS/NJAS web site is adding new content all the time.

Our newsletter is available to members and can be downloaded saving money and resources. The Transactions and the Program and Proceedings has been converted to on-line digital copy available through UNL Digital Commons as well as EBSCO Publishing. Publishing digitally allows us to upload research articles as they are submitted resulting in more timely distribution of research information. For information about accessing or submitting Transactions articles go to our website: [www.neacadsci.org](http://www.neacadsci.org). Click on NEWS; then click on Publications (found on the left side bar). Proceedings articles will continue to be submitted through section chairs. Don't forget to “friend” the NATS Facebook as well.

## OPPORTUNITIES

The Nebraska Science News is a publication of the Nebraska Academy of Sciences, a private foundation associated with the American Association for the Advancement of Science.

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NATS President: Joe Myers

NJAS President: Aurietha Hoelsing

NAS Executive Secretary: Cecelia Dorn

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Website: [www.neacadsci.org](http://www.neacadsci.org) Donations are tax deductible.

The next few articles detail opportunities available in the next few months. These articles detail volunteer needs, professional development, and websites offering content knowledge. Scholarship and teacher certification information is also detailed. Please take time to scan these “opportunities”.

## 2015 SCIENCE OLYMPIAD NATIONAL TOURNAMENT MAY 15 – 18, 2015 UNIVERSITY OF NEBRASKA- LINCOLN

## PIE GRANTS UPDATE

Five applications were received for fourth quarter consideration. Recipients were Pheasants Forever, “Train the Trainer” Prescribed Fire Program; PRRIP & NE Water Leaders Academy, Em2 Geomodel: Experiencing How Rivers Work; Science Olympiad 2015, Engaging Nebraska Students in Environmental Science; and Nebraska Wildlife Federation, Grouse Habitat Guide for Land Owners.

Eight applications were received for consideration on January 9, 2015. These six were awarded grants: Elkhorn Valley Museum, Exploring Vegas Park; Audubon Nebraska, Audubon’s Nebraska Crane Festival; The Nature Conservancy, The Central Nebraska Prairie Reader; WasteCap Nebraska, Lincoln Community Soil Rebuilders-Advance Composter Training; Community Crops, Sustainable Agriculture Education Program; and Loup Basin Resource Conservation and Development, 2015 Loup Basin Recycling Guide.

The Public Education and Minigrant program awards up to \$3000 to support the presentation and dissemination of information and perspectives that will stimulate enhanced environmental stewardship in any category eligible for Nebraska Environmental Trust (NET) funding. These categories are habitat, surface and ground water, waste management, air quality, and soil management.

Second quarter 2015 PIE grant applications are due April 3, 2015. Grant forms and information can be found on our website, [www.neacadsci.org](http://www.neacadsci.org). Click on NAS and then click on Grants and Scholarships.



The 2015 Science Olympiad National Tournament committee is seeking volunteers to help with over 3000 guests expected to attend May 15 – 18. To volunteer go to the Science Olympiad web page: <http://www.scienceolympiad2015.com/>

Under “Recent News” (lower left of the web page) click on the “Volunteer for Nationals!” link. Your time and skills are needed to make this a success and showcase Nebraska to the rest of the country. Teams from around the nation will represent their states at the highest level of academic achievement in science, technology, engineering, and math. If you have questions please contact James Blake, [jblake@lps.org](mailto:jblake@lps.org).

## HIGH SCHOOL SCHOLARSHIP APPLICATION DEADLINE MARCH 1, 2015

The high school scholarship application deadline is March 1<sup>st</sup>. Winners will be announced by April 1<sup>st</sup> and will be invited to attend the 125<sup>th</sup> Annual Meeting on April 17<sup>th</sup> where they will receive their scholarship check.

## UNL MAsT PROGRAM Next Deadline: March 1st

The UNL Master of Arts with emphasis in science teaching MAsT Program is getting the word out about their teacher certification program. Nebraska needs highly-qualified science teachers. Many science teachers who teach physics do so under a broad field endorsement that only requires that they have taken two undergraduate classes

in the subject area. Our program requires that people have at least an undergraduate degree in their content area to become a science teacher. Dr. Beth Lewis directs the program and is the Principal Investigator on a national Science Foundation grant to provide fourteen \$13,000 scholarships annually to science professionals who would like to become science teachers.

Information for science professionals who may be considering a career change and need initial teacher certification through a program such as ours is available on the MAst website. <http://cehs.unl.edu/tlte/masters-degree-teaching-certification#MAst>. If you need more information, please don't hesitate to contact us.

Lyrica Lucas  
College of Education and Human Sciences  
UNL

## CSI: PROFESSIONAL DEVELOPMENT OPPORTUNITY

Do you like using science to solve mysteries? So do we! CSI: Classroom Student Investigations is an excellent PROFESSIONAL DEVELOPMENT opportunity for science teachers. Forensic cases will be developed in which teachers and students will engage in inquiry-based activities to solve the cases. A wide variety of science fields (life, chemical, physical, and technology) will be included in this program. All cases will incorporate "real-world" activities and teachers will be given information how to adapt to their own classrooms. The workshop will be held June 15-26, 2015 (preference will be given to grades 7-10, but others will be considered as space allows), and a limited amount of travel support may be available. Teachers will receive room/board and up to \$2000 stipend for successful completion of summer and academic year activities. Workshop is held on the campus of Arkansas State University, Jonesboro, AR. You'll have the weekend free to explore the area-go shopping, go to movies or out to eat, travel to Memphis (about an hour away) or explore the many outdoor activities in the "Natural State" <http://www.arkansas.com/>. For more information and application forms, see our website <http://altweb.astate.edu/csiscience>

This project is funded by a grant given to Arkansas State University by the National Science Foundation (NSF 09-506 Innovative Technology Experiences for Students and Teachers-ITEST)

## NEW ACTIVITY ON THE SCIJINKS WEBSITE: LIGHTNING DETECTION

Why would we want a tool to detect lightning? It's pretty hard to miss, isn't it? Well, it turns out there are different kinds of lightning, and detecting some kinds early can help meteorologists predict when a storm will get worse. Read the latest SciJinks article to learn about the history, use, and future of lightning detection. <http://scijinks.gov/lightning-detection>. SciJinks is a joint NOAA and NASA educational website about weather and other Earth science topics. It targets middle- and high-school aged students.



## WORKSHOP: Explore Students' Science Identity & Inquiry-based Investigations of Human Biology

**WHEN** Monday through Friday, June 15 – 19, 2015  
**WHERE** University of Nebraska – Lincoln, City Campus  
**WHO** Middle and High School Educators  
**WHAT** Partner with social scientists to explore how students develop science identity. engage in inquiry-based activities with UNL scientists studying viruses, other microbes, and parasites.

Join with colleagues to learn new science and teaching methods. Collaborate with UNL sociologists studying student engagement with science. Engage with UNL scientists conducting microbe research. Parent friendly: Invite your kids to participate in science camps, scholarships available. All expenses covered including a \$500 honorarium. Workshop limited to the first 20 educators who sign-up.

To sign-up or for more information, contact Judy Diamond, [jdiamond1@unl.edu](mailto:jdiamond1@unl.edu).

*This workshop is sponsored by the NIH-Science Education Partnership Award (SEPA) Biology of Human Project, University of Nebraska State Museum.*

## THE HEAVYWEIGHT CHAMPION OF THE COSMOS

As crazy as it once seemed, we once assumed that the Earth was the largest thing in all the universe. 2,500 years ago, the Greek philosopher Anaxagoras was ridiculed for suggesting that the Sun might be even larger than the Peloponnesus peninsula, about 16% of modern-day Greece. Today, we know that planets are dwarfed by stars, which themselves are bound together by the billions or even trillions into galaxies.

But gravitationally bound structures extend far beyond galaxies, which themselves can bind together into massive clusters across the cosmos. While dark energy may be driving most galaxy clusters apart from one another, preventing our local group from falling into the Virgo Cluster, for example, on occasion, huge galaxy clusters can merge, forming the largest gravitationally bound structures in the universe.

Take the "El Gordo" galaxy cluster, catalogued as ACT-CL J0102-4915. It's the largest known galaxy cluster in the distant universe. A galaxy like the Milky Way might contain a few hundred billion stars and up to just over a trillion ( $10^{12}$ ) solar masses worth of matter, the El Gordo cluster has an estimated mass of  $3 \times 10^{15}$  solar masses, or 3,000 times as much as our own galaxy! The way we've figured this out is fascinating. By seeing how the shapes of background galaxies are distorted into more elliptical-than-average shapes along a particular set of axes, we can reconstruct how much mass is present in the cluster: a phenomenon known as weak gravitational lensing.

That reconstruction is shown in blue, but doesn't match up with where the X-rays are, which are shown in pink! This is because, when galaxy clusters collide, the neutral gas inside heats up to emit X-rays, but the individual galaxies (mostly) and dark matter (completely) pass through one another, resulting in a displacement of the cluster's mass from its center. This has been observed before in objects like the Bullet Cluster, but El Gordo is much younger and farther away. At 10 billion light-years distant, the light reaching us now was emitted more than 7 billion years ago, when the universe was less than half its present age.

It's a good thing, too, because about 6 billion years ago, the universe began accelerating, meaning that El Gordo just might be the largest cosmic heavyweight of all. There's still more universe left to explore, but for right now, this is the heavyweight champion of the distant universe!

Learn more about "El Gordo" here: <http://www.nasa.gov/press/2014/april/nasa-hubble-team-finds-monster-el-gordo-galaxy-cluster-bigger-than-thought/>

*El Gordo is certainly huge, but what about really tiny galaxies? Kids can learn about satellite galaxies at NASA's Space Place <http://spaceplace.nasa.gov/satellite-galaxies/>.*

Dr. Ethan Siegel

## WHAT THE HECK IS A HIGGS BOSON?

Dan Claes to present "What the Heck is a Higgs boson?" as the spring Nebraska Lecture at UNL

The Higgs boson particle, and its potential to explain the fabric of the universe, has captured worldwide attention. Dan Claes, a member of UNL's high energy physics team that has conducted experiments on the Large Hadron Collider in Switzerland, will present the campus's spring Nebraska Lecture, "What the Heck is a Higgs boson?" The free public lecture is April 8 at 3:30 p.m. in the Nebraska Union auditorium, 14th and R streets. Visit the Nebraska Lectures website for more details at [research.unl.edu/nebraskalectures](http://research.unl.edu/nebraskalectures).

## NAS ANNUAL MEETING REGISTRATION FORMS AND FALL CONFERENCE PROPOSAL FORMS

**Available at the end of this newsletter. Ballots will be mailed in mid-March to paid members. Please register ahead of time. See you soon. You can register for the NAS Annual Meeting and submit your NATS Fall Conference Proposal on line.**

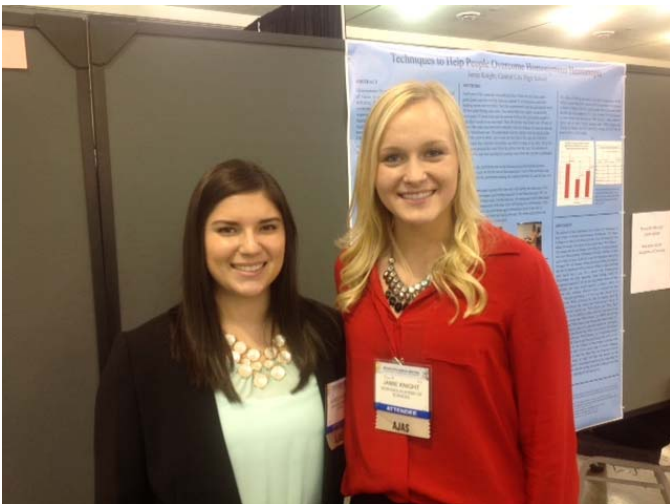
<http://nebraskaacademyofsciences.wiIdapricot.org/page-1228210>



## AJAS HIGHLIGHTS IN PICTURES



Brittany Boyd, Doane College and Amy Leising, Omaha Zoo Academy Teacher



Isabella Gomez, University of Nebraska at Kearney and Jamie Knight, Nebraska Wesleyan University



Jacob Wagner, University of Nebraska-Lincoln



Holly Irmer, Hillsdale College; Alexis Foster, Illinois College; Merritt Polomsky, Iowa State; Dan Sitzman, NAS President; Joan Christian, Beatrice High School, Ed Brogie, NAAS Executive Director.



Jameson Collier, Wayne State College

## Who: Qualifies?

Any K-12 Nebraska Science educator... however priority will be given to teachers

From high needs districts as determined by NDE (free reduced meals, AYP not met/needs improvement, teaching outside endorsement)

Assigned to ELL or SPED

From districts with 25% of students below proficient on state science assessments

Other extenuating circumstances

## Teacher Commitment...

Attendance and participation in 8 day summer institute (52 hours)

3 days at NATS Fall Conference (16 hours)

16 hours of follow up peer coaching

**Nebraska Science Keep Improving Content Knowledge and Skills<sup>3</sup>** is a statewide project funded under Title II, Part B of the No Child Left Behind (NCLB) Math Science Partnership program. The goal of the project is to enhance the content knowledge and instructional skills of Nebraska's K-12 Science teachers, thereby enhancing student achievement.

Science Kicks<sup>3</sup> content specific institutes will allow for deeper content coverage at all grade levels and, for a more fully developed integration of science (inquiry) and engineering practices. Kicks<sup>3</sup> institutes will extend teacher content knowledge beyond grade level assignment as well as explore in detail how the Nebraska State standards translate into classroom content and practice at the grade band level. Because there is a part to whole and whole to part nature to the structure of the summer workshops and because K-12 teacher participants will be at the same site there will also be opportunity to explore K-12 content progressions in science. Further deepening teacher understanding of science content, particularly as it relates to student readiness, age appropriate content and science curriculum.

One measure of the success of the project is teacher implementation of both grade level appropriate content and content pedagogy. The coaching component of future **Kicks<sup>3</sup>** workshops provides the necessary reflection, dialogue and feedback to support teacher participants back in their classrooms. Like all things important to improving our practice it is Time consuming...Worth it!!

## Teacher Benefits

- Build your Science content knowledge and develop your instructional repertoire to better serve ALL students.
- Opportunity to think critically about your own instructional practice
- Peer coaching to support content/pedagogy implementation
- \$140/day contracted payment (before payroll deductions)
- Lodging for participants traveling more than 75 miles one way
- College graduate credit available (3 or 6 hours)
- Attendance at the NATS Fall Conference
- Membership in Science Matters state and national network



## What **KICKS<sup>3</sup>** Participants are Saying

**“Relevant/engaging PD that changes how you learn science and collaborate with other teachers.”**

**“I was able to apply the things I learned to every aspect of my teaching and also to every class that I teach.”**

**“It was practical, useful information that I can use right away.”**

**“Peer coaching has been great. It is wonderful to have a coach that understands my age-group of students.”**

**Register online at [kicks3.org](http://kicks3.org)**



KEEP IMPROVING CONTENT KNOWLEDGE AND SKILLS<sup>3</sup>

# 2015 Summer Institutes

## Physical Science 2015

**Where:** Millard West Senior High  
5710 So 176th Ave, Omaha, NE

**When:** June 15-18 and June 22-25  
NATS Fall Conference: September 24-26  
Peer Coaching Sessions: Sept. 26-Dec. 12

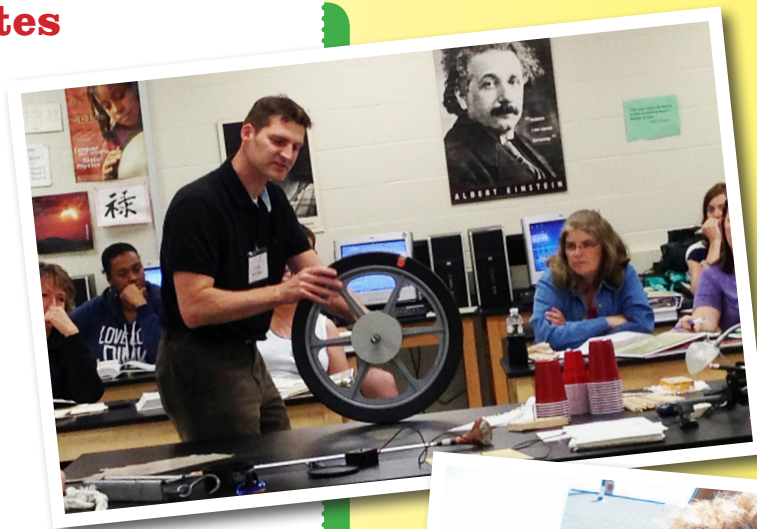
**Who:** Grades K-12 Physical Science Teacher

## Life Science 2015

**Where:** Scottsbluff Middle School (Days 1-4)  
East 23rd Street, Scottsbluff, NE  
- AND -  
UNK Bruner Hall of Science (Days 5-8)  
2401 11th Avenue, Kearney, NE

**When:** June 2-5 @ Scottsbluff Middle School  
- continues -  
June 9-12 @ UNK Bruner Hall of Science  
NATS Fall Conference: September 24-26  
Peer Coaching Sessions: Sept. 26- Dec. 12

**Who:** Grades K-12 Life Science Teachers



**“KICKS has  
changed the  
way I teach.”**



Register on-line

**By March 15, 2015**

**kicks3.org**

For more information please contact:

**Deb Paulman**  
**kicks3 Project Director**

Educational Service Unit #16  
314 West 1st Street  
PO Box 915  
Ogallala, NE 69153  
Work: 308-284-8481  
Fax: 308-284-8483  
dpaulman@esusixteen.org

# NAS SPRING GENERAL REGISTRATION FORM

THE NEBRASKA ACADEMY OF SCIENCES, 125th ANNUAL MEETING AND AWARDS RECEPTION, APRIL 17, 2015  
NEBRASKA WESLEYAN UNIVERSITY  
50th AND ST. PAUL, LINCOLN, NE

**PLEASE: REGISTER BEFORE THE MEETING.** WE WOULD LIKE TO SAVE YOU TIME AND  
AVOID CONGESTION AT THE REGISTRATION TABLE.

Name \_\_\_\_\_

Mailing  
Address \_\_\_\_\_

City/State \_\_\_\_\_ ZIP \_\_\_\_\_

Area \_\_\_\_\_ Daytime  
Code \_\_\_\_\_ Phone # \_\_\_\_\_

E-mail address: \_\_\_\_\_

**REGISTRATION FEE** \$ \_\_\_\_\_

\$ 15 Students w/ ID

\$ 70 Member Registration, includes dues

\$ 25 Members Reg, 2015 dues previously paid

\$ 70 Registration, non-members

\$ 25 Life Members

**DUES**

\$ 10 Students w/ ID \$ \_\_\_\_\_

\$ 45 General membership, NOT  
attending the meeting

**CONTRIBUTION\*** \$ \_\_\_\_\_

**LUNCH TICKET** \$ \_\_\_\_\_

@ \$ 7.95 each

**AWARDS RECEPTION TICKETS** \$ \_\_\_\_\_

@ \$ 15.00 each

**TOTAL** \$ \_\_\_\_\_

**MAKE CHECKS PAYABLE TO:**

THE NEBRASKA ACADEMY OF SCIENCES or NAS

302 MORRILL HALL, 14th and U STREETS

LINCOLN, NE 68588-0339

nebacad@unl.edu

(402) 472-2644

\_\_\_\_\_ I plan to attend the **MAIBEN MEMORIAL LECTURE**, 11:00  
a.m., Olin Auditorium B

\_\_\_\_\_ I plan to attend the **LUNCH** (use the cafeteria line and pay there  
or send in payment and receive a ticket)

\_\_\_\_\_ I plan to attend the **AWARDS RECEPTION** at 5:45 p.m., April  
17, First United Methodist Church, 2723 N 50<sup>th</sup> St. (Outstanding  
Science Students from high schools of Nebraska as well as scholarship  
winners will receive their awards during the reception.)

**PLEASE INDICATE WHETHER YOU WISH TO GO  
THROUGH THE LUNCH LINE AND/OR ATTEND THE  
AWARDS RECEPTION, NO LATER THAN APRIL 3<sup>rd</sup>.**

\*Contributions are tax deductible; dues and registration are not.

To Pay with a Credit Card please complete the following:

Circle: Visa, MC, Discover

Name on Credit Card \_\_\_\_\_

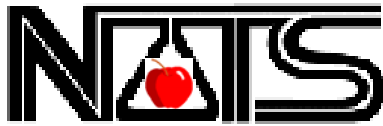
Credit Card Address if different \_\_\_\_\_

\_\_\_\_\_ cc zip code \_\_\_\_\_

Credit Card Number \_\_\_\_\_

Three digit security code \_\_\_\_\_ Expiration Date \_\_\_\_\_

Fax: (402)472-8899



NATS PROGRAM PROPOSAL

2015 Fall Conference
September 24-September 26, 2015

www.neacadsci.org

FOR OFFICE USE ONLY

Session Type
Day
Time Length

NOTE: All Presenters are asked to register for the Conference. Registration fee is \$125, includes membership.

Please complete a registration form and include with your program proposal.

CAMP CALVIN CREST DOES NOT HAVE INTERNET ACCESS. PLEASE PLAN ACCORDINGLY FOR YOUR PRESENTATION

Please Type or Print (legibly in black) Information as You Wish It to Appear in Convention Program

Principal Presenter

Second Presenter

Name, Dept., School/Business, Preferred Mail Address, City, State Zip(+4), Phone: Work Home, Fax, Email

NOTE: For any additional presenters, please include the information requested above on an additional page.

Session Data

Session Title, Brief Description (50 words or less)

State Standard(s) Address in Presentation Please list Standards in the following form: 4.7.4 or 8.2.1 or 12.3.2. It is recommended that in your presentation you include assessment ideas for the standards you address. This is absolutely necessary!

NATS Bookstore Item The NATS bookstore can arrange to sell publications from the NSTA catalog. If appropriate, provide the Title and Author of an NSTA catalog item that closely links to your presentation. Presenters may also sell publications during their presentation time.

I have a publication suggestion for the NATS bookstore that is linked to my presentation. Title: Author(s):

Description of Session Types (Check One that describes your presentation):

- Demonstration: Presenter demonstrates a series of experiments, scientific phenomenon or an apparatus used in science. Limited audience participation. Theater-style setup.
Hands-On Workshop: Presenter involves audience with materials. Classroom-style setup.
Make It Take It: Hands on activities where participants leave with product to take back to classroom. Classroom-style setup.
Field Trip: Can be at Camp Calvin Crest or transported to another site. (Minimum of 2 hours). Include transportation plans.
Contributed Paper: Presenter shares results of research or shares a creative teaching strategy. Theater-style setup.
Short Course: A 2-3 hour session/workshop that may include in depth information on a topic or hands-on experience that requires more than a single session.

**Length of Session:**

- Three Hour Thursday Afternoon Workshop (1:30 – 4:30)
- One Hour - (the standard length presentation)
- Two Hour –

Please Mark your choice:

- Friday Only
- Saturday Only
- Friday or Saturday

**Science Area: (Check only one for listing in final Program.)**

- |   |   |                                     |   |
|---|---|-------------------------------------|---|
| <input type="checkbox"/> Biology/Life Science | <input type="checkbox"/> Physics/Physical Science | <input type="checkbox"/> Integrated | <input type="checkbox"/> Elementary                 |
| <input type="checkbox"/> Chemistry            | <input type="checkbox"/> Environmental Science    | <input type="checkbox"/> Inquiry    | <input type="checkbox"/> Technology                 |
| <input type="checkbox"/> Earth/Space Science  | <input type="checkbox"/> General                  | <input type="checkbox"/> Assessment | <input type="checkbox"/> Science/Technology/Society |

**Intended Audience:**

- K-3
- 4-6
- Middle/Junior High
- Senior High
- Post Secondary
- All

**Maximum number of participants for your session? (Room assignments based on space availability)**

- 15 or fewer
- 16 - 30
- 31 - 50
- No Preference

**AV Equipment: (NOTE: Equipment not listed below is to be provided/arranged by the presenter.)**

- Screen

**Fees may be charged for the cost of materials only. Presenter(s) are responsible for collecting fees for the session.**

- The fee for this session is \$\_\_\_\_\_.
- There is no session fee.

Fee pays for:\_\_\_\_\_

**Repeat Session:**

Would you be willing to present your session twice?  YES  NO

**Safety Issues**

As a NATS presenter, you must comply with the "Minimum Safety Guidelines to NATS Presenters and Workshop Leaders" and you must agree to comply with the guidelines during your presentation. This compliance form will be sent when we send you the program confirmation letter.

**Special Room Arrangements:** Normal arrangements will include tables and/or chairs unless otherwise requested. Special set ups dependent on availability of resources. List any special needs you will have:  
\_\_\_\_\_  
\_\_\_\_\_

Only the *principal presenter* will be contacted concerning confirmations. All correspondence will be sent to the email address of the principal presenter. The principal presenter must share information with his/her co-presenter(s).

If you or any member of your team would like an administrator, division chief, etc. notified of your participation post-conference, please indicate below. Use additional sheets if necessary. Be certain to designate which presenter's administrator, etc. matches with which presenter if there is more than one presenter in your group.

Name _____	Name _____
School _____	School _____
Position _____	Position _____
Address _____	Address _____
City _____	City _____
State, Zip (+4) _____	State, Zip (+4) _____

**Return one copy of this proposal by August 1, 2015:**  
**(later proposals will be accepted only as space allows)**  
 NATS  
 302 Morrill Hall, 14<sup>th</sup> and U Streets  
 Lincoln, NE 68588-0339  
[nebacad@unl.edu](mailto:nebacad@unl.edu)  
 402/472-2644