Dear Science, Agriculture Education, Family and Consumer Sciences, and Extension and Outreach Educators:

It is with great pleasure that I invite you to attend one or more of the bio-technology or bioethics workshops offered in Ames this summer. Educators in public and private schools or those who work with youth in 4-H or other community programs can strengthen and update their STEM-based curriculums with modern content, techniques, and activities in biotechnology and bioethics, while earning professional development or Iowa State University graduate credits at the workshops.

The workshops, instructed by Clark Wolf and myself, will be held in the Biotechnology Outreach Education Center (BOEC) and Molecular Biology Building through the month of June on the Iowa State campus. Iowa teachers can receive stipends of $100 per day to help cover their costs of attending. ISU Extension and Outreach educators or personnel can receive travel reimbursements of up to $100 per day to help cover their expenses. Materials and stipends for the workshops are funded by Iowa State's Office of Biotechnology and by the Iowa Biotechnology Association. Upon completion of any of the workshops, Iowa teachers and ISU Extension and Outreach educators are eligible to receive free supplies and equipment for specific lab protocols from the Office of Biotechnology.

Please share this invitation with your colleagues. I hope to see you in Ames this summer!

Sincerely,
Mike Zeller
Biotechnology Outreach Education Coordinator

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Don't miss the Research Experiences for Teachers (RET) opportunities to work with Iowa State researchers. See p. 3.

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Iowa State University Office of Biotechnology
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Iowa Biotech Opportunities

Biotechnology education workshops

Winter 2020

Biotechnology Education Workshop I
Iowa State University, Ames
June 8-11, 2020

This workshop course is directed at science, agriculture, family and consumer sciences, and ISU Extension and Outreach educators who want to gain the basic knowledge and laboratory skills necessary to teach biotechnology in their classrooms.

Teachers will learn how to prepare and instruct the laboratories in DNA extraction and quantification from various sources, DNA transformation, DNA fingerprinting, antibiotic resistance, biofuels, and more. Educators will prepare and perform the lab protocols as the students would do in class.

Credits
• 2 professional development credits – $70
• 2 ISU graduate credits – cost to be announced

Stipend
• $400 stipend for Iowa teachers ($100 per day) funded by the Iowa Biotechnology Association

Travel
• Travel reimbursement available for ISU Extension and Outreach educators/personnel (up to $100 per day)

Registration deadline
May 27, 2020

Questions? Contact Mike Zeller, 515-294-5949, or mzeller@iastate.edu

Biotechnology Education Workshop II
Iowa State University, Ames
June 22-25, 2020

This advanced workshop is open to science, agriculture, family and consumer sciences, and ISU Extension and Outreach educators who have attended one of the previous biotechnology workshops.

Educators will learn how to prepare and instruct advanced biotechnology laboratories in their classrooms. Activities will include marker assisted selection, DNA isolation, recombinant DNA techniques, DNA amplification, restriction analysis of DNA, bioinformatics, sequencing, genomics, and more. Educators will prepare and perform the lab protocols as their students would do in class.

Credits
• 2 professional development credits – $70
• 2 ISU graduate credits – cost to be announced

Stipend
• $400 stipend for Iowa teachers ($100 per day) funded by the Iowa Biotechnology Association

Travel
• Travel reimbursement available for ISU Extension and Outreach educators/personnel (up to $100 per day)

Registration deadline
May 27, 2020

Bioethics workshop

Bioethics Workshop I
Iowa State University, Ames
June 15-18, 2020

This course is designed for educators who want to incorporate discussion of ethical issues into existing K-12 course work. Participants will create case studies designed to integrate ethical content in the science curriculum, which might also be used to address such issues for extension audiences.

The focus will be on ethical issues in science education, including especially agricultural biotechnology, but other bioethics topics will also be covered.

The workshop will also address pedagogical issues, including appropriate objectives for bioethics units, alternative approaches to bioethics pedagogy, and other issues that regularly arise in the science ethics classroom.

Workshop participants will work through activities and case studies

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Associate Professor of Ecology, Evolution and Organismal Biology
Director of the Office of Biotechnology

Glenda D. Webber
Editor

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Stipends for the two biotechnology education workshops generously are provided by the Iowa Biotechnology Association.
**Iowa Biotech Opportunities**

that they can take back to their own classes. Participants also will work in groups to develop a participatory case study designed expressly for their own students and will leave with classroom-ready case study exercises for use in their own classes.

**Credits**
- 2 professional development credits – $70
- 2 ISU graduate credits – cost to be announced

**Stipend**
- $400 stipend for Iowa teachers ($100 per day)

**Travel**
- Travel reimbursement available for ISU Extension and Outreach educators/personnel (up to $100 per day)

**Registration deadline**
May 27, 2020

Questions? Contact Clark Wolf
515-294-3068, jwcmwolf@iastate.edu.

Iowa State University is offering 6-12 grade science, math, or engineering/technology teachers or instructional leaders who work directly with classroom teachers the opportunity to participate in research experiences and develop on-going professional relationships with career scientists.

The goal of the program is that participating teachers will be better prepared to share the latest developments in STEM fields with their students and to inspire them to learn more about science and engineering and their related career paths. Applications from individual or teams of teachers are encouraged.

**Are you qualified?**
In addition to the requirements mentioned above, high quality candidates will need to have at least one year of classroom teaching experience, live within driving distance of the Iowa State University campus in Ames, commit to the entire six weeks of the program, and complete the application by the deadline.

**Stipends, travel allowance, and more**
A stipend of $900/week for six weeks and up to $500 in travel will help teachers cover their expenses. A classroom supplies allowance is provided to help teachers incorporate science experiences into their classrooms and curriculums. All programs take place at or near Iowa State University where teachers will have the opportunity to tour campus facilities and learn about on-going research projects. Graduate credit and license renewal credit also are available at the teacher’s own expense.

**Major activities**
Teachers will engage in cutting-edge research under the guidance of a faculty mentor and members of their labs for approximately 35 hours per week for six weeks. The 2020 dates are June 15 through July 20. Strong professional relationships with researchers from Iowa State will be developed through small group discussions about their research, leading to strategic partnerships that could bring new ideas into the classroom.

Teachers will have time to focus on their professional learning and will receive help in translating their summer learning into activities for use in their classrooms with master educators from the Des Moines school system. Follow-up activities may include faculty and graduate student visits to teachers' high schools and opportunities for high school students to conduct small independent research projects.

**Choose a research project**
The Office of Biotechnology coordinates with faculty members from all across campus to offer a selection of research opportunities for teachers in engineering, technology, mathematics, life sciences, chemistry and many others. Teachers are encouraged to be specific about the type of research that fits their classroom best when filling out the application.

**Learn more and apply**
The application deadline is March 15, 2020. For details, please visit [www.biotech.iastate.edu/RET](http://www.biotech.iastate.edu/RET) or contact:

Dr. Jeanne Serb
Director
Office of Biotechnology
Ph. 515-294-7479
E-mail serb@iastate.edu
Iowa Biotech Expertise

Mike’s message . . .

By Mike Zeller
Biotechnology Outreach Education Center Coordinator

The Winter 2020 edition of the Iowa Biotech Educator serves to officially invite you to our summer Biotechnology Education Workshops and announce the dates, location, and where to find specific information.

All this information can be found on p. 2. The workshops offer you a chance to experience the most modern STEM techniques and concepts in life sciences. After completing one or more workshop(s), you will be eligible for free equipment and supplies. Please share this issue with your colleagues and/or direct them to our website (www.biotech.iastate.edu/for-k-14-educators) so they, too, can benefit from the resources the Biotechnology Outreach Education Center (BOEC) can offer educators.

Make sure to also examine the summer Research Experiences for Teachers (RET) opportunity the Office of Biotechnology is offering. More information can be found in this newsletter on p. 3.

BOEC’s role in STEM

I want to remind you that the BOEC is here to help you enhance your STEM initiatives in life sciences with biotechnology resources and expertise. Just contact Lori Miller, lorimill@iastate.edu, or me anytime to order supplies or equipment, to schedule a visit to the BOEC, or to have your questions answered. I have arranged my schedule so that most days I am exclusively available from 7:00-8:30 a.m. weekdays for your questions through emails or phone calls, except when I travel. My office phone is 515-294-5949 or email me at mzeller@iastate.edu.

Fall semester in the BOEC

This fall, I was kept busy teaching pre-service teachers from the family and consumer sciences program and with several sessions for undergraduate and graduate courses here on campus.

Along with teaching, I presented to 17 Iowa State sponsored and outside school groups in the BOEC. In November alone, over 300 students in grades 5-12 visited the BOEC for hands-on biotechnology lab experiences. Typically, the demand for the BOEC outreach services is very high in the spring. Please order supplies and schedule visits as soon as your schedule allows for your spring classes.

For more information about event visits or field trips to the BOEC on Iowa State’s campus, please contact Lori or me to answer questions and/or schedule a date(s).

It was good seeing many of you at the Iowa Academy of Sciences Iowa Science Teaching Section conference in early October at DMACC’s FFA Center in Ankeny, Iowa. We were pleased to again display our new PCR equipment for loan and supplies for PCR activities that are available to schools. It’s always great to connect with the group of you who were able to attend the conference.

PCR in your classroom

Remember the BOEC has available thermal cyclers and high-speed microcentrifuges to loan teachers to do PCR activities in their advanced biology curriculums. Depending on your individual equipment situations/needs, the BOEC can loan you the equipment and offer supplies, including alternative gel and PCR product staining methods to complete the TPA-25 Alu sequence PCR activity the BOEC has available. Additionally, each of the four thermal cyclers has been programmed with the most popular Bio-Rad and Carolina Biological PCR protocols that you can purchase on your own. This flexibility allows you to use the Iowa State equipment (pictured above) to do these science supply companies’ PCR activities.

Planning for the spring semester

Remember, if you are planning a visit to the BOEC or need supplies, contact Lori or me as soon as you can to reserve dates and/or schedule deliveries. As of this writing, the spring schedule for the BOEC is filling up fast, so please plan ahead. I hope you will let the BOEC and the Office of Biotechnology assist you in your life science STEM endeavors by bringing biotechnology into your classroom.

Have a great start to spring semester.
Iowa STEM Competitions

Major award programs for which Iowa science educators or their students are eligible are featured below. For other award, competition, and grant opportunities for educators or students, visit the Office of Biotechnology's educational funding website at www.biotech.iastate.edu/educational-awards-and-funding-sources.

State Science and Technology Fair March 26 – 27

The State Science and Technology Fair of Iowa (SSTFI) will be held in Ames on Thursday and Friday, March 26-27. The fair is open to any student in grades 6-12 residing in or attending school (public, private, parochial or home school) in the state of Iowa.

The SSTFI is affiliated with the Intel International Science and Engineering Fair. All high school exhibitors at the fair are eligible for college scholarships. In addition, the top two individuals, the top team project, and their teachers will be awarded trips to the Intel International Science and Engineering Fair in May at Anaheim, California. All exhibitors in grades 6-12 are eligible for prizes and many other special awards.

As one of the fair sponsors, the Iowa Biotechnology Association (IowaBio) will be making five scholarship awards at the 2020 fair. The IowaBio scholarships will be awarded to the five students who exhibit the best use of biotechnology with their projects.

All Iowa high school students who exhibit top-level projects at the fair are eligible for the IowaBio scholarships, which are $2,000 if used at an Iowa school of higher education or $1,000 if used at an out-of-state institution of higher education.

The 2019 winners were Pooja Kasiviswanathan, Ames High School, Ames; Kayla Livesay, Van Buren High School, Keosauqua; Shelby Westhoff, Beckman Catholic High School, Dyersville; Claire Wills, Central Lee High School, Donnellson; and Radha Velamuri, Valley High School, West Des Moines.

In addition to the five IowaBio scholarships, the Association is working with the Biotechnology Institute, an educational foundation headquartered in Washington D.C., to award an Iowa BioGENEius Challenge Winner. The Iowa BioGENEius Challenge winner will compete at the International BioGENEius challenge in San Diego, California, next summer. The 2019 BioGENEius winner was Claire Wills, Central Lee High School, Donnellson.

For more information about the SSTFI, visit www.extension.iastate.edu/sstfi or contact Nate Weber, 515-294-8848, nweber@iastate.edu. Volunteers are being recruited to judge at this year's event. For details, see https://www.extension.iastate.edu/4h/sstfi-volunteer-and-judges-information.

Ames Lab / Iowa State host science bowls

The Iowa Regional High School Science Bowl

This year's Iowa Regional High School Science Bowl is scheduled for Saturday, January 25, 2020, on the Iowa State University campus in Ames. The event is hosted by the U.S. Department of Energy's Ames Laboratory and Iowa State University.

During the competition, teams of up to five students, including one alternate, answer questions from categories such as biology, chemistry, mathematics, physics, earth and space sciences, and energy.

The regional winning team is awarded an all-expenses-paid trip to compete in the Department of Energy's National Science Bowl® in Washington, D.C., from April 30 - May 4, 2020. Pleasant Valley High School (Bettendorf) students were last year's champions of the Regional High School Science Bowl.

The Iowa Regional Middle School Science Bowl

The science bowl for grades 6-8 will be Saturday, February 22, 2020, on the Iowa State University campus in Ames. This event also is hosted by the U.S. Department of Energy's Ames Laboratory and Iowa State University.

Participants will compete in a question-and-answer contest about life science, physical science, earth and space science, energy, mathematics, and general science. The winning academic team of the 2020 competition will receive an all-expenses-paid trip to the National Middle School Science Bowl® in Washington, D.C., to compete from April 30 - May 4, 2020. The Stilwell (West Des Moines) team 2 students won the championship of last year's Middle School Science Bowl.

For more information

To learn more about the science bowls, go to https://www.ameslab.gov/education/science-bowl or contact Deb Samuelson at 515-294-9537, debsam@ameslab.gov, or Steve Karsjen at 515-294-5643, karsjen@ameslab.gov.
Iowa STEM Competitions

Excellence in science teaching award nominations accepted throughout year

Nominations from administrators, colleagues, or self-nominations are accepted continuously throughout the year by the Iowa Academy of Science (IAS) for its Excellence in Science Teaching Awards. These awards honor outstanding science teachers in Iowa’s K-12 schools. The submission deadline each year for completed application packets is January 31.

Iowa teachers of all grade levels in all science areas are eligible to be nominated in one of the eight nomination categories: elementary science; earth, space, environmental science; general/multiple science; life science; middle school/junior high science; physical science; STEM (elementary, middle school, high school); and science supervisory. The awardees will be recognized at the IAS Annual Meeting to be held April 17-18, 2020, in Des Moines. For details, visit the website at www.scienceiniowa.org/awards or e-mail iasscience@uni.edu.

2020 I.O.W.A. STEM Teacher Award concludes program

The Iowa Governor’s STEM Advisory Council’s STEM Teacher Award sponsored by Kemin Industries has closed applications for 2020. Judging has taken place and recipients will be announced this month.

The award, now in its sixth year, recognizes one teacher from each of the six STEM regions for their dedication and contributions to science, technology, engineering, and math (STEM) education for Iowa students.

Each recipient receives a $1,500 award for their classroom and an additional $1,500 for personal use.

The 2020 recipients will be recognized during events at their respective schools in January and at a statewide event in February. For a full list of final recipients of the 2020 I.O.W.A. STEM Teacher Award, visit https://iowastem.gov/teacheraward at the end of January.

Nominations for the 2021 I.O.W.A. STEM Teacher Award will open in the fall.

National STEM Competitions

Outstanding biology teacher award deadline on March 15

March 15 is the deadline for biology teachers of grades 7-12 to nominate a colleague or themselves for this year’s Outstanding Biology Teacher Award, sponsored by the National Association of Biology Teachers (NABT). Nominees are judged on their teaching ability and experience, cooperativeness in the school and community, and student-teacher relationships.

Please take the time to nominate a deserving colleague or yourself. Nomination instructions can be found in the Awards section of the NABT website at https://nabt.org/.

The deadline for Outstanding Biology Teacher Award nominations and most other 2020 NABT awards is March 15, 2020.

For more information, contact Mike Zeller, mzeller@iastate.edu.

Iowa educators named national award winners for math, science teaching

Four Iowa educators were among 215 teachers nationwide who have achieved the highest honors given by the United States government for excellence in K-12 mathematics and science teaching, the Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST).

The recipients were announced on October 15.

Enacted by Congress in 1983, the competition alternates each year between teachers of grades K-6 and teachers of grades 7-12. The award includes $10,000, a certificate signed by the President of the United States, a paid trip to Washington, D.C., and more. The awards are administered by the National Science Foundation.

Iowa’s most recent recipients of the national PAEMST award are:
National STEM Competitions

Mathematics
• Deborah Little, Denver Community School District (K-6)
• Maria “Gabby” Granadillo, Cedar Rapids Community School District (7-12)

Science
• Katie McGrane, Waverly-Shell Rock Community School District (K-6)
• Mike Todd, Ames Community School (7-12)

Granadillo and Todd were state finalists in 2017, and Little and McGrane were state finalists in 2018.

Also announced last fall, are four more state finalists for grades 7-12. The two math finalists are Sharon K. Jaeschke, Southeast Valley High School, Gowrie, and Stephanie S. Steines, Decorah High School, Decorah. The two science finalists are Bradley Jacobson, Central Academy, Des Moines Public Schools, and Carol Reierson, North Fayette Valley Community School District, Elgin.

Nominate for 2020 awards
March 1 is the deadline for online nominations of teachers of grades K-6 for the Presidential Awards for Excellence in Mathematics and Science Teaching. Nominated teachers have until May 1 to submit their applications. For more information about the PAEMST awards, e-mail info@paemst.org or visit the website at www.paemst.org.

Free Biotech Resources

Biotechnology discoveries of 2019
http://hudsonalpha.org/the-annual-guidebook

New discoveries in genetics, genomics, and biotechnology are highlighted in the free Biotechnology Discoveries and Applications guidebook for 2019-2020 published by the HudsonAlpha Institute for Biotechnology. This nonprofit institute located in Huntsville, Alabama, publishes an annual biotechnology guidebook describing new research discoveries. The guidebook can be downloaded as a free PDF file.

Learning objectives
The guidebook’s articles are linked to the Alabama Course of Study for courses in high school biology, genetics, AP biology, and multiple career and technical education courses. The articles can be integrated with similar course objectives from other states and systems.

Science snapshots
In the 24-page guidebook, recent research findings are grouped into several sections. In the Science Snapshots section are one-paragraph descriptions of 10 of the past year’s top genetics and biotechnology stories.

New findings
Following the snapshots are short article updates on new findings in the fields of genetics, genomics, and biotechnology and how they translate into discoveries, treatments, or applications that have been announced during the past year.

Topics include yeast cells with light-harvesting nanoparticles to make yeast into more efficient drug factories, poverty’s lasting genetic impact on individuals, the genetic mechanisms of domesticating dogs, switching on embryo genes, fecal microbiota transplantation to reduce autism symptoms, bacteria that can convert type A blood into universal donor type O, a universal flu vaccine, and many more.

Foundational concept
The 2019-2020 guidebook contains an illustrated two-page article describing the human microbiome, the collection of microscopic organisms found on skin, throughout the digestive system, and inside body cavities like the mouth and nose. The article addresses where microbial communities are found, how they are shaped, their benefits, and how they can be altered.

Digital applications
Online applications featured include an app to view 3D cell structure, a timeline of 200 major accomplishments and milestones in genetics and biotechnology stretching back 10,000 years, an interactive game centering on the genomics of disease, and an activity to explore the human genome.

Make your own biotech discoveries in 2020!
Summer workshops at the Biotechnology Outreach Education Center (BOEC) (p. 2)
Research Experiences for Teachers (p. 3)
Field trips to the BOEC in Ames (p. 4)
About Iowa State’s Public Education Program in Biotechnology. . .

Iowa State University’s Public Education Program in Biotechnology thanks donors for their generous support:
Sustaining donor: Iowa Biotechnology Association
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