62\textsuperscript{nd} Annual Meeting
October 19\textsuperscript{th}- 20th, 2018
Hosted by
Marquette University
Milwaukee, WI
Conference will take place in:
Cramer Hall Room 016, **604 N. 16th St.**, Milwaukee, WI
53233 (between Wisconsin Ave. and W. Clybourn St.)
Ph: (414) 288-7250
http://www.marquette.edu/

**Driving Directions**

**Wifi Access**

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- Call the IT Services Help Desk at (414) 288-7799
- Visit the IT Services Help Desk in Cudahy Hall 293
- Or email helpdesk@marquette.edu

**EDUROAM**

If you are visiting from another college, your school may be an eduroam Wi-Fi participant ([https://www.eduroam.org/where/](https://www.eduroam.org/where/)). If your college is part of eduroam, skip MU Guest Wi-Fi. Instead, use eduroam with your own school's email address and password to connect to Wi-Fi. See here for more info: [http://www.marquette.edu/wifi/eduroam.php](http://www.marquette.edu/wifi/eduroam.php)
ACUBE’s 62nd Annual Meeting Program Overview

Most sessions take place in Cramer Hall, 604 N. 16th St., Milwaukee, WI 53233

Thursday, October 18th
6:30-8:00pm  ACUBE Steering Committee Meeting

Friday, October 19th
8:00- 9:00am  Registration and Breakfast
9:00- 9:30 am  Welcoming Remarks and Meeting Orientation
9:30-10:30 am  Keynote Address by Dr. Janet Branchaw
10:40-11:05 am Concurrent Presentations (20 minute Sessions)
11:10- 11:50 am Concurrent Presentations and Round Table Discussions (40 minute sessions)
12:00- 1:00 pm  Lunch sponsored by Bio-Rad
12:30- 1:00 pm  Bioscene Meeting
1:15-2:35 pm  Concurrent Presentations and Workshops (80 minute sessions)
2:45- 3:25 pm  Concurrent Round Table & Discussions (40 minute sessions)
3:35-3:55 pm  Concurrent Presentations (20 minute sessions)
4:05-5:25 pm  Concurrent Presentations and Workshops (80 minute sessions)
5:30- 6:00 pm  Directions and travel to the Italian Community Center
6:00- 8:30 pm  Dinner Reception at the Italian Community Center

Saturday, October 20th
8:00-9:00 am  Breakfast and Poster Set up
9:00-9:40 am  Concurrent Round Table & Discussions (40 minute sessions)
9:50-11:10 am  Concurrent Presentations and Workshops (80 minute sessions)
11:20-11:40 am  Concurrent Presentations (20 minute sessions)
11:50-12:50 pm  Lunch and ACUBE members meeting
1:00-4:00 pm  Field Trips
4:15- 4:35 pm  Concurrent Presentations and Workshops (20 minute sessions)
4:45-6:00 pm  Cocktail Hour sponsored by JoVE and Poster & Exhibitor Session
6:00- 7:30 pm  Dinner and HHMI Movie Night
7:30-8:00 pm  Awards and Closing
8:00- 10:00 pm  Steering Committee Meeting
Our Mission
Members of ACUBE share ideas and address the unique challenges of balancing teaching, research, advising, administration, and service. We are a supporting and mentoring community that provides professional development opportunities to:

- Develop and recognize excellence in teaching
- Incubate new and innovative teaching ideas
- Involve student research in the biology curriculum
- Advise and mentor students in and out of the classroom
- Enhance scholarship through our national, peer-reviewed journal Bioscene

Governance
President, Rebecca Burton, Alverno College
Past-President, Christina Wills, Rockhurst University
Executive Secretary of Finance, Greg Smith, Lakeland University
Executive Secretary of Membership and Website Editor, Christina Wills, Rockhurst University
Secretary, Paul Pickhardt, Lakeland University
Historian, Conrad Toepfer, Brescia University
Editor of Bioscene, Robert Yost, Indiana University Purdue University

Steering Committee
Jessica Allen, Rockhurst University
Laurieann Klockow, Marquette University
Khadijah (Gigi) Makky, Marquette University
Holly Nance, College of Coastal Georgia
Scott Shreve, Lindenwood University-Belleville
Jason Wiles, Syracuse University

Local Arrangements Chair, Khadijah (Gigi) Makky, Marquette University
Program Chair, Laurieann Klockow, Marquette University
ACUBE gratefully acknowledges the support of the following exhibitors at the 62nd Annual Meeting:
Keynote Speaker: Dr. Janet Branchaw

Biography

JANET BRANCHAW is Assistant Professor of Kinesiology at the University of Wisconsin-Madison. She is the Director of the Wisconsin Institute for Science Education and Community Engagement (WISCIENCE), the Associate Director of the NIH-funded Mentor Training Core of the National Research Mentoring Network, and the Chairperson of NSF’s Biology Research Experiences for Undergraduates (REU) Leadership Committee. Branchaw directs a NSF-funded REU Site program, the Integrated Biological Sciences Summer Research Program, and has developed training curricula for research mentors, Entering Mentoring, 2nd ed., and undergraduate research mentees, Entering Research. She also led a project to develop a common assessment tool for use across NSF’s REU programs. Her scholarship focuses on the development, implementation, and evaluation of innovative approaches to undergraduate science education, with a special emphasis on undergraduate research, assessment of student learning and broadening participation in science among underrepresented groups. She has taught undergraduate, graduate and medical physiology and a freshman seminar course in biology. Her early career research was in cellular neurophysiology and membrane biophysics. She holds a B.S. in Zoology from Iowa State University and a M.S. and Ph.D. in Physiology from the University of Wisconsin - Madison.

Keynote Address: Assessment: Your Ally in Advancing Student Learning

Assessment of student learning is key to advancing our efforts to improve undergraduate STEM education. However, scientists are rarely trained in assessment methods and may not be aware of how to fully utilize assessment data to improve their teaching and to track their students’ learning. A variety of student learning assessment methods and tools will be presented, including new tools recently developed to measure student learning of the Vision and Change core concepts and to measure undergraduate and graduate research trainee learning gains.
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<tr>
<td>6:30-8:00pm</td>
<td>Steering Committee Meeting</td>
<td>Cramer 016</td>
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<td>7:30-9:00am</td>
<td>Registration and Check In with continental breakfast</td>
<td>Cramer Hall 16th</td>
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<td>9:00-9:30am</td>
<td>Welcoming Remarks and Meeting Orientation</td>
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<td>9:30-10:30am</td>
<td>Keynote Presentation - Assessment: Your Ally in Advancing Student Learning</td>
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<td>10:40-11:00am</td>
<td>Concurrent Presentations (20 minutes)</td>
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<td>Short scientific interventions enhance students’ scientific identity</td>
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<td>Liz Hernandez-Matias¹, Pablo A. Llerandi Roman², Faviola Laureano-Torres³, Lizmar Pérez-Donato¹, Natalia Calzada-Jorge¹, Stephanie Mendoza⁴, A. Valance Washington¹, and Michelle Borrero¹</td>
<td>Cramer 087</td>
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<td>¹University of Puerto Rico, Río Piedras, ²Centro de Recursos para Ciencias e Ingeniería de UPR, ³University of Puerto Rico, Cayey, and ⁴University of Puerto Rico, Bayamón</td>
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<td>Using abstracts to assess student understanding of lab activities</td>
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<td>Debbie Mueller, <em>Cardinal Stritch University</em></td>
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<td>Tiny Earth - Student Sourcing Antibiotic Discovery</td>
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<td>Sam Rikkers, <em>Tiny Earth Network, University of Wisconsin-Madison</em></td>
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<td>11:10-11:50am</td>
<td>Concurrent Round Table &amp; Discussions (40 minutes)</td>
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<td>Catalyzing Change in Your Department using PULSE resources</td>
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<td>Heather Seitz, <em>Johnson County Community College</em> and Karen Klyczek, <em>University of Wisconsin-River Falls</em></td>
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<td>Using Student Group Spokesperson in Class...and other Flipping Ideas.</td>
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<td>Tom Davis, <em>Loras College</em></td>
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<td>Pre-Health Professional Advising</td>
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<td>Laurie Goll, <em>Marquette University</em></td>
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<td>11:10-11:50am</td>
<td>Bioscene Office Hours with Bioscene editor, Robert Yost</td>
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<td>12:00-1:00pm</td>
<td>Lunch, sponsored by Bio-Rad</td>
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<td>First call for Out of this World Teaching Contributions</td>
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<td>12:30-1:00pm</td>
<td>Bioscene Meeting</td>
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<td>1:15-2:35pm</td>
<td>Concurrent Presentations and Workshops (80 minutes)</td>
<td>Entering Research: A Curriculum to Support Undergraduate and Graduate Research Trainees</td>
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<td>Hands-on Gross Anatomy Review and Tutorial</td>
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<td>Addressing Student Misconceptions with Interactive Models: Flow of Genetic Information and Cell Division</td>
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<td>2:45-3:25pm</td>
<td>Concurrent Round Table &amp; Discussions (40 minutes)</td>
<td>Alternative Assessment Approaches to be More Inclusive and Inspiring</td>
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<td>Investigative learning in undergraduate biology labs</td>
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<td>Developing Resources and Programs for Pre-Health Students</td>
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<td>3:35-3:55pm</td>
<td>Concurrent Presentations (20 minutes)</td>
<td>Plant Tracer: a time-lapse App for students to visualize, quantify and report novel mutants in plant motion</td>
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<td>Girls’ Academy of Science and Mathematics at Alverno College</td>
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<td>Salt of the Earth- An Investigation of Halotolerance in Soil Microbes</td>
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<td>Is video a better way to learn?</td>
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### Concurrent Presentations and Workshops (80 minutes)

**Manual Gene Annotation: A Hands-on Bioinformatic Approach to Annotating Genomic DNA using BLAST and Publicly Available Databases as Part of the Genomics Education Partnership**

Nighet P Kokan, Teresa M Holzen, Emily Rader, Tyler Grisar, and Frederik Benzon

1. **Cardinal Stritch University**
2. **Mount Mary University**

Raynor Library 227

**Genetic medicine frontiers: Using HHMI Biointeractive Resources to Teach Current and Future Research in Gene Therapies and Early Success Stories.**

Alexandra Fairfield, HHMI Biointeractive and Montgomery College

Cramer 046

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**Using Kits to Enhance Learning and Shorten Grading Time**

Mary Holland, B.A.C.K. for Learning

Cramer 042

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**Concurrent Presentations and Workshops (80 minutes)**

**Conserving Panda Populations through Understanding their Reproductive Endocrinology**

Ian Harwood and Ingrid Miller, Bio-Rad Laboratories - Bio-Rad Explorer Program

Cramer 042

**The Science and Ethics of CRISPR-based Genome Editing**

Tim Herman and Margaret A. Franzen, Milwaukee School of Engineering

Cramer 038

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**Conquering the Learning Bottleneck of Tissues Identification**

Sarah B. Lovern, Concordia University

Cramer 042

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Sarah B. Lovern, Concordia University

Cramer 042
### Teaching Personalized Medicine in the Classroom: A Pharmacogenetics Case Study Based on Patient Data
Audra Kramer and Khadijah Makky, *Marquette University*

### Exploring the Characteristics of Life Using Student Photographs
Selinda Martinez, *Laredo College*

### Is video a better way to learn?
Nathan Welch, *JoVE Core*

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<td>11:50-12:50pm</td>
<td>Lunch and ACUBE Members Meeting</td>
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<td>First call for committee nominations</td>
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<td>Second call for Out of this World Teaching Contributions</td>
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<td>Instructions/directions for the field trips</td>
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<td>1:00-4:00pm</td>
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<td>Field trip 1: Guided Tour of Milwaukee’s Mitchell Park Horticultural Conservatory (The Domes)</td>
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<td>Field trip 2: Guided Tour of Chudnow Museum of Yesteryear</td>
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<td>Field trip 3: Explore Milwaukee lakefront with option to independently visit The Milwaukee Art Museum, the Science Discovery Museum, or walk along the lakefront</td>
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<td>4:15- 4:35pm</td>
<td>Concurrent Presentations (20 minutes)</td>
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<td>The effects of an introduction to biological research course on novice students’ views on the nature of science</td>
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<td>Kelly M. Schmid, Ryan D.P. Dunk (presenting), and Jason R. Wiles, <em>Syracuse University</em></td>
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<td>Making Meaningful Connections through Service Learning in an Introductory Biology Course</td>
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<td>Reflections on an Interdisciplinary Seminar to Develop and Enhance the Problem-Solving and Thinking Habits of First-Year Students</td>
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<td>Marlee Marsh and Adrienne Y. Oxley, <em>Columbia College</em></td>
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<td>Hosted bar and appetizers available</td>
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<td>Poster Presentations</td>
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<td>1-Assessing the Genetic Literacy of Nursing Students</td>
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<td>Melissa Haswell, <em>Davenport University</em></td>
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<td>2-Teaching Sustainability</td>
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<td>Christine Bezotte, <em>Elmira College</em>, and Giacomo Berceli, <em>Marco Polo Program</em></td>
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3-Using “Study Group Selfies” to encourage consistent study group attendance leads to improved course performance.
Amy K. Hebert and Merrilee F. Guenther, Elmhurst College

4-Inquiry based laboratory exercises using yeast prions.
Anita Manogaran, Marquette University and Gregory Smith, Lakeland University

5-The REFLECT Project: Redesigning Education for Learning through Evidence and Collaborative Teaching. Tara Prestholdt, Carolyn James, Eric Anctil, Heather Dillon, and Stephanie Salomone, University of Portland

6-Evaluation of a Pre-/Post-Test for Assessing Student Learning in an Introductory Biology Course
Scott M. Shreve, Lindenwood University-Belleville

7-The Strategic Undergraduate STEM Talent Acceleration Initiative (SUSTAIN): Early Findings
Jason R. Wiles, John W. Tillotson, and Karin Ruhlandt, Syracuse University

8-Effect of a 6-Week Biology Course on Scientific Engagement and Literacy in High School Students
Mitchell Spring, Kelsey Benton, Elizabeth Doncheck, Matthew Herbst, Deborah Joye, Brian Maunze, and Anna Miller, Marquette University

9-Drawing to Learn…. but do students know how?
Laurieann Klockow, Marquette University

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<td>HHMI Biointeractive</td>
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<td>Milwaukee School of Engineering - Center for Biomolecular Modeling</td>
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ABSTRACTS BY CATEGORY

20 minute Presentations

10:40-11:00AM FRIDAY SESSION

Short scientific interventions enhance students’ scientific identity
Liz Hernandez-Matias¹, Pablo A. Llerandi Roman², Faviola Laureano-Torres³, Lizmar Pérez-Donato⁴, Natalia Calzada-Jorge¹, Stephanie Mendoza⁴, A. Valance Washington¹, and Michelle Borrero¹. ¹University of Puerto Rico, Rio Piedras, ²Centro de Recursos para Ciencias e Ingeniería de UPR, ³University of Puerto Rico, Cayey, and ⁴University of Puerto Rico, Bayamón

To increase STEM retention, a worldwide effort has been placed to provide authentic, science programs for high school students. In Puerto Rico, where high school attrition rate is high and standardized test scores on science are below levels of proficiency, we hypothesized that we could use short interventions to raise scientific identity and further on improve retention rates. To test this hypothesis, we developed a one-week research intervention for high school students in Puerto Rico where students’ scientific identity and project cognitive and affective gains were addressed. Particularly, we wanted to know if one-week hands-on research experience positively influences project gains and scientific identity. To address this research objective, twenty-five students from different schools with low proficiency scores on science were part of a one-week scientific experience at the University of Puerto Rico. Participants were divided in two non-overlapping groups; both groups participated of active learning experiences, targeted gene modification tools lectures, oral presentations, and one-to-one interactions with members of the scientific community. One group was part of the authentic hands-on research experience, which was focused on reproduce Essential Trombocythemia Calreticulin mutations in cell lines using CRISPR-Cas9. The comparison group was part of the creation of CRISPR-Cas9 models and demonstrations. Data were collected using a survey on scientific identity, students’ reflexive diary and focal interviews. The results of the scientific identity survey show that scientific identity was enhanced at the end of the program for both groups. The significant difference between the pre and post surveys in the comparison group is stronger than in the experimental group. Using qualitative content analysis and preconceived categories found on long-term research experiences, we found that participants report cognitive and affective gains. Interestingly, both groups perceived that they were doing experiments. Although the comparison group did not perform any hands-on experiments, they report that the fact of doing CRISPR-Cas9 models, being in a research laboratory, seeing the instrumentation, and comparing CALR sequence between mice and human made them feel like scientists. These findings suggest that our one-week scientific programs enhance participants’ scientific identity and create an opportunity to develop further studies on short interventions.

Using abstracts to assess student understanding of lab activities
Debbie Mueller, Cardinal Stritch University

Lab reports are a common way to assess for understanding of lab activities in an undergraduate classroom. The usual method of assessment is either a fill in the blank/short answer worksheet included with a lab manual or a formal lab report. The lab manual worksheet can be tedious to grade and often times didn’t adequately assess for student understanding of the experiment. Formal lab reports are another option. While providing insight into student understanding of what they did, they are time consuming to grade because most students lack the skill in scientific writing thus limiting the number of reports I would assign. I wanted a lab report format that was easy to assess and would provide evidence that students understood the main points of the experiment - what they were doing, why they were doing it, what were the results and what conclusions could be made based on
In this presentation, I will talk about using a highly structured writing assignment as a quick way to assess for student understanding of a lab activity. In lieu of traditional lab reports, for most lab activities, students write an abstract of their results using a very prescriptive formula that requires students to distill and clearly indicate the central question being asked in the activity, how they went about answering that question, and was there an answer to the question. The advantage of this system, coupled with data presentation, is a lab report that is significantly less time consuming to grade, is easy to discern if the student truly understood the main points of the lab, and provides an opportunity to improve their scientific writing skills.

**Tiny Earth - Student Sourcing Antibiotic Discovery**  
Sam Rikkers, Tiny Earth Network, University of Wisconsin-Madison

Tiny Earth centers around an introductory biology course that engages students through hands-on field and laboratory research on soil samples in the hunt for new antibiotics. Differentiating itself from traditional courses, Tiny Earth’s course provides original research opportunities rather than relying on cookbook experiments with predetermined results. This approach follows recommendations from the National Science Foundation and American Association for the Advancement of Science, which are based on evidence that discovery-based learning early on increases motivation, learning, and retention. Through a series of student-driven experiments, students collect soil samples, isolate bacteria, and test strains for inhibitory activity against clinically-relevant microorganisms. This is particularly relevant as most antibiotics come from soil bacteria. By engaging thousands of student researchers around the world in the quest to discover new antibiotics, this “student sourcing” model provides a unique and sustainable path to replenish the antibiotic pipeline.

**3:35-3:55 PM FRIDAY SESSION**

**Plant Tracer: a time-lapse App for students to visualize, quantify and report novel mutants in plant motion**  
Eric D. Brenner\(^1\), Alvaro F. Olsen\(^2\), Yixiang, Mao\(^2\), Winnie Zhao\(^1\), Javiera Valle\(^2\), Jon Prosperi\(^2\), Jiazhen Zhang\(^2\), Victor N. D. Carvalho\(^3\), Angelica M. Guercio\(^4\), Changyuan Li\(^2\), Keisha Milsom\(^2\), Jan L. Plass\(^2\), and Yao Wang\(^2\)

\(^1\)Pace University, \(^2\)New York University, \(^3\)Centre de Résonance Magnétique Biologique et Médicale, \(^4\)University of California, Davis

To enable students to contribute new knowledge towards identifying the molecular players involved in plant movement, we are developing Plant Tracer, a NSF funded App designed for use in smartphones and tablets to quantify movement characteristics that occur during gravitropism (movement towards or away from gravity) and circumnutation (the periodic regular swaying found in plant organs). The use of time-lapse movies in the classroom is one of the most effective methods to interest students in plant biology. Having students create time lapse movies of plant movement in the laboratory is an even more effective way of interesting students in plant research\(^1\). As part of a crowd sourced method, Plant Tracer is being used by both students and researchers to detect mutant genes in the flowering stems of Arabidopsis that cause impairment in proper gravitropic or circumnutation responses. Plant Tracer represents a new approach to draw young scientists into the field of plant biology through research and inquiry with their omnipresent digital device. This endeavor comes at an intellectually vulnerable time when student interest in plant biology is waning, due to sociological changes that have led to a world increasingly disconnected from nature.

**Girls’ Academy of Science and Mathematics at Alverno College**  
Amal El-Sheikh, Alverno College
I would like to share our experience of encouraging young women to pursue careers in science through an afterschool program designed for junior and senior high school students. The Girls’ Academy of Science and Mathematics is a two-year afterschool program that runs from October through May and meets 22 times each academic year. Its mission is to encourage first-generation, minority girls to consider a career in the sciences. The program offers a two year curriculum for both juniors and seniors. Students can participate in both their junior and senior years or can choose to participate in only one of the years. The program has been running for 6 years, and has served over 350 students.

Each Friday, students participate in two hours of coursework. College readiness activities and workshops are incorporated throughout the program, beginning in the junior year with introductory college exploration. Seniors focus on preparing college applications and receiving advice and mentorship from Alverno faculty and students working in the Girls’ Academy.

Curriculum design of Girls’ Academy is grounded in hands-on project-based learning. For the junior participants, the curriculum is based on an overarching theme, the Science of Beauty, and uses topics such as skin biology, cosmetic chemistry, and experimental design and analysis to motivate and attract high school girls to science. For the final 5 weeks of each academic year, all junior participants come together in small groups to design, develop, test, and present a cosmetic product of their choice.

Seniors participate in applied, cross-disciplinary sessions as well, but focus on food science. They work in small investigative groups to conceptualize, develop, test, and present a food-related item or method. Faculty and undergraduate students’ involvement Girls Academy participants receive instruction and guidance from four Alverno faculty. The program employs from five to seven current Alverno undergraduate students who serve as student assistants. They help faculty with the lesson setup and instruction. But most importantly, by interacting with the high school participants they bridge the gap between the faculty and high school students and serve as role models for the incoming younger generation.

**Salt of the Earth- An Investigation of Halotolerance in Soil Microbes**
Nathaniel Van Doorn, Brandon Semma, and Julie Zwiesler-Vollick (presenting), Lawrence Technological University

Many Michigan communities use salt to treat icy roads in the winter. Several studies have been conducted to determine the impact that this salt has on wetlands and in a few cases their flora and fauna. However, no studies have been published investigating the impact that road salt has on soil microbes. Microbes which are tolerant of or require salt for growth are termed halotolerant and halophilic, respectively. There is great interest in microbes which can grow under extreme environmental conditions (extremophiles) for basic biological interest and as a possible source for novel biochemistry. In order to test the hypothesis that road salt application was impacting the soil microbiome, we implemented a course-based undergraduate research experience in the microbiology lab. Several microbiology lab classes at Lawrence Technological University (LTU) were able to isolate halotolerant microbes in soil from a variety of locales. In fact, at several locations, the majority of microbes were halotolerant. The data for these calculations were gathered by plating microbes in parallel on both nutrient agar and nutrient agar with 5% sodium chloride. The number of colonies at a specific dilution were then compared and used to calculate the percentage of microbes which were halotolerant. However, at some locations there appeared to be more halotolerant microbes than non-halotolerant microbes. In the latest lab class, students were asked to choose soil locations that were either close to or far from salt-treated roads or sidewalks. While there was a great deal of variability in the number of halotolerant soil microbes (and the choice of soil sampling locations), the overall trend is that there were more halotolerant
Is video a better way to learn?
Nate Welch, JoVE Core

Is video a better way to learn? Students have been learning through the medium of the textbook since the 17th century and through the printed word since the Ancient Sumerian Tablets. However, the rapid advance of technology has provided us with alternatives to the printed textbook. With the recent research into the neuroscience of learning, and with the rapid advancement of video animation and software design, is the textbook still the best option for student learning potential? This session will explore how Kolb's Cycle of Learning drives courseware design as well as identify the four key concepts of positive technology experience for students. "

11:20- 11:40AM SATURDAY SESSION

Conquering the Learning Bottleneck of Tissues Identification
Sarah B. Lovern, Concordia University Wisconsin

Tissue identification is a threshold concept for students studying anatomy and physiology. Students need to be able to determine what a particular tissue looks like to better understand what its function and location will be in the human body. Threshold concepts is a theory that certain particularly-difficult concepts are critical to understanding a discipline (Middendorf & Shopkow, 2018.) If students are unable to grasp a specific concept, they are unable to progress to other aspects of the course and fail to show comprehension of the subject matter. Furthermore, learning bottlenecks are parts of the curriculum in which students fail to grasp material even if they are diligently trying, prepared for class, and aided by instructors that have thoroughly presented the discipline-specific content (Middendorf & Shopkow, 2018.) As an area that students often struggle greatly, tissue identification is also a bottleneck. To minimize this struggle and maximize retention, a new technique to work through tissue identification was developed and implemented in BIO 191: Human Anatomy and Physiology I during the spring of 2018. Students were given a pre-test and then instructed on how experts work methodically in a step-by-step mental process to identify tissue. Students then practiced with partners and alone in lecture settings, lab exercises, and online. Students were given a mid-test during the semester and post-test at the conclusion. These tests also included questions pertaining to the process used by the students to categorize the tissues. Quantified as well as qualitative results about the students’ abilities as well as opinions of the process will be presented. This work has been approved by the CUW Institutional Review Board.

References

Teaching Personalized Medicine in the Classroom: A Pharmacogenetics Case Study Based on Patient Data.
Audra Kramer and Khadijah Makky, Marquette University

Personalized medicine is the future of healthcare. Pharmacogenetics is a driving force for personalized medicine, but a challenging topic for pre-health students to grasp. Practical examples in the form of active learning is one way to help students understand pharmacogenetics and to critically think through applications in medicine. This case study was designed for an advanced human genetics course. This is a large lecture-based course where the majority of the students have a pre-health focus. The case study presented here is based on a real story and it
utilizes pharmacogenetics screening results from a pediatric patient. The students have the chance to analyze a medical report and to interpret real patient data. The child’s guardian has given consent to use this data in our case study for our educational purposes. Brian’s case is a case of an adopted child with complicated psychiatric issues and no known family medical history. This is a multifaceted-case with two main components for the students to comprehend: social/medical ethics and the genetic determinant of drug response. We presented the case in 40 minutes and used clicker questions to assess students’ learning. Overall the students were quick to understand the ethical components of pharmacogenetics but needed extra help with understanding the mechanism behind the drug response determined by Brian’s genotype. To help students make the connection between genotype and the mechanism of drug response we used a presentation that walked students step by step through the pathway of drug metabolism, followed by peer-to-peer group discussions. Exam questions were used to assess the students’ learning retention of the components of this study. In these questions 83% of students responded correctly on the ethics-based question, and 86% answered correctly on the drug metabolism component. These results suggest that the students learned and retained both the ethical and applied pharmacogenetics components of the case study. While this case study was initially created for an upper-level genetics course, our ultimate goal is to modify it to a form that can be adapted to introductory biology and pharmacology courses.

Exploring the Characteristics of Life Using Student Photographs
Selinda Martinez, Laredo College

In this activity, students explore the characteristics of life by using digital media technology (i.e digital camera, smart phone, and tablets) to take pictures of living organisms and non-living objects rather than using pre-made cards. Students then post the pictures on a discussion board to ensure originality and creativity as no photo can be repeated and must be different from another students’ post. Once in class, students are then grouped in teams of 4 and view a slide show on all the pictures taken. Each group will then come up with a list of characteristics in which all the living organisms’ pictures have in common but will exclude the non-living objects. This activity takes approximately 50-75 min and is intended for either an undergraduate major or non-major biology class. It can be extended further to include having students come up with their own definition of life to include the characteristics they listed while comparing their definition to other definitions of life. This activity was adapted from “What is Life? An Activity to Convey the Complexities of The Simple Question” by Annie Prud’homme-Genereux.


Is video a better way to learn?
Nate Welch, JoVE Core

Is video is a better way to learn? Students have been learning through the medium of the textbook since the 17th century and through the printed word since the Ancient Sumerian Tablets. However, the rapid advance of technology has provided us with alternatives to the printed textbook. With the recent research into the neuroscience of learning, and with the rapid advancement of video animation and software design, is the textbook still the best option for student learning potential? This session will explore how Kolb’s Cycle of Learning drives courseware design as well as identify the four key concepts of positive technology experience for students.

4:15- 4:35PM SATURDAY SESSION
The effects of an introduction to biological research course on novice students’ views on the nature of science
Kelly M. Schmid, Ryan D.P. Dunk (presenting), and Jason R. Wiles, Syracuse University

Previous research has shown that understanding the aims, processes, history, and philosophy of science (a branch of knowledge collectively referred to as the nature of science [NOS]) is important for understanding and acceptance of a variety of scientific phenomena, perhaps especially those that are socially – but not scientifically – controversial topics such as climate change and evolution. Our prior research has shown that NOS understanding is one of the most important factors in explaining variation in evolution acceptance among university students, especially among those who have completed a year of biology instruction. In addition, change in acceptance of evolution over a year of introductory biology was most significantly correlated with change in student understanding of NOS, particularly with regard to understanding science as amoral, unified, and testable. Here, we seek to extend our work through a qualitative inquiry into how an introduction to biological research course early in students’ undergraduate education may impact their understanding of the nature of science. Among the goals of the course were to give a broad introduction to biological research; to showcase the types of research being done in the university’s biology department; and to promote skills in reading, writing, and discussing science. This was a small, seminar-style course in which students read and summarized scientific articles, engaged in small and large group discussions, explored faculty research labs, and learned to write about science for both general public and scientific audiences. To assess the impact of this course on students’ NOS conceptions, four questions from the Views on the Nature of Science- C (VNOS-C) questionnaire were administered at the beginning and end of the semester. Here, we present the results of this effort, with special attention given to changes in early science students’ conceptions of the nature of science from before to after the introduction to research course. This study will allow us to better understand how engaging in this type of course early in their undergraduate career might help develop students’ understanding of the nature of science in preparation of future science courses.

Making Meaningful Connections through Service Learning in an Introductory Biology Course
Jessica Allen, Rockhurst University, Steve Jacobsen, Missouri Department of Conservation, and Joanna J. Cielocha, Anita B. Gorman Discovery Center

Service learning (SL) engages students in the learning process beyond the classroom through relevant and meaningful service in the community. It has gained considerable traction in higher education over the past decade. However, designing authentic and effective service learning opportunities beyond “volunteering” can be challenging. This service project was created during The McMeel Faculty Institute on Service Learning offered by the Center for Service Learning at Rockhurst University (RU). The SL project was implemented in the second course of the General Biology sequence at RU. The course covers four units: ecology, evolution, plant/fungal diversity and function, and animal diversity and function. The SL primary objective was to promote learning and communication of biological concepts through service. A community partnership was established with the Missouri Department of Conservation, Anita B. Gorman Discovery Center (DC). Fall 2017 a trial run of 11 students completed a minimum of 10 hours each. Spring 2018 a total of 60 students completed a minimum of 5 hours each. Service included RU Students assisting DC Educators on programs primarily designed for local elementary aged students (K-6). Programs offered age appropriate material relating to plant and animal diversity, conservation, and ecosystems in Missouri. RU students were required to participate in service during multiple units. Following each unit a written reflection was submitted on how their service related to the classroom material covered in the current unit. A final reflection was administered to assess the students’ overall impression of the SL experience and how it impacted their learning in the course. These final reflections revealed that while many students were apprehensive about the service at the beginning of the semester, they ultimately found that the service directly aided in their learning of course content. Often students found that
service helped solidify their understanding of key terms by explaining complex ideas to younger students at the DC. This demonstrates the success of the SL project in meeting our primary objective of promoting communication of biological concepts. Moreover, students were able to make meaningful contributions to their community by communicating science with elementary students and our community partner staff.

Reflections on an Interdisciplinary Seminar to Develop and Enhance the Problem-Solving and Thinking Habits of First-Year Students  
Marlee Marsh and Adrienne Oxley, Columbia College

Columbia College science and math faculty have designed, developed, and begun evaluating a first-year enhancement program Development and Enhancement of Problem Solving and Thinking Habits (DEPTH) seminar. Our hypothesis is that DEPTH will improve mathematics and quantitative problem-solving skills in first-year women and underrepresented minorities (URM) who are underprepared in mathematics and will provide them with a foundation to succeed in college-level STEM courses. Science faculty will implement and test the innovative DEPTH model to assess its ability to improve mathematics and quantitative problem-solving skills; increase students' self-efficacy, resilience, and persistence in STEM; and provide contextual and active learning experiences in alignment with the learning styles of women and URM. The objectives are to demonstrate improvements in first-year students' mathematics achievement, problem-solving skills, and academic persistence, as assessed by academic performance, retention, engagement, and commitment to a STEM career. An overview of the project and results from the first year of the DEPTH seminar will be presented.

40 minute Presentations

11:10- 11:50AM FRIDAY SESSION

Catalyzing Change in Your Department using PULSE resources  
Heather Seitz, Johnson County Community College and Karen Klyczek, University of Wisconsin-River Falls

How do you create an inclusive, student-centered and evidence-based life science program for students in your department? In this session, participants will learn about strategies to implement Vision and Change recommendations. The Partnership for Undergraduate Life Sciences Education (PULSE) provides programs, activities, and resources that are used by departments to help facilitate transformation. In this session PULSE resources and programs will be shared, highlighting the Midwest and Great Plains Regional (MWGP) Network and the Ambassador program. The MWGP network facilitates connections and collaborations between departments in local areas in the Midwest and Great Plains states. Participants will learn how their departments can connect with events scheduled for 2018-19. The primary goal of the Ambassador program is to facilitate productive discussions in life sciences departments, aimed at enabling department members to work collaboratively toward a common vision. Some of the facilitated leadership strategies used by the Ambassadors will be highlighted. Finally, we will discuss opportunities to have a PULSE ambassador visit at your institution.

Using Student Group Spokesperson in Class…and other Flipping Ideas.  
Tom Davis  Loras College

The role of student group spokespersons in human physiology or human anatomy lecture classes will be described. Interactive examples of the benefits of this flipped classroom strategy will be presented. Increased student-to-student talking and learning, critiques of other group’s answers and drawings, and inclusion of all
group members input are a few of the benefits to be discussed. Other variations of small group activities in lecture will also be presented and discussed in this session. Come and share how you get more students talking and learning from each other in your classes.

Pre-Health Professional Advising  
Laurie Goll, Marquette University

Do you advise pre-med, pre-dent, pre-PA, pre-PT or other prehealth professional students? At the Center for Prehealth Advising at Marquette University, we provide support, resources and advising to students pursuing careers in the health professions. In this workshop, I will offer up-to-date information on:

- Statistics on who is getting accepted into medical school
- Advising and preparing students to become competitive applicants
- Guiding students in navigating the application process
- Talking with students that may not be ready for the health professions about next steps

2:45-3:25PM FRIDAY SESSION

Alternative Assessment Approaches to be More Inclusive and Inspiring  
Mark Milanick, University of Missouri

Problem. I would like to use grades to motivate (reward) students for behaviors and accomplishments that I value, for example class attendance, homework assignments and class project. However, if I weigh all 3 of these equally, then a student can still get an A if the only get 70% in one area and 100% in the other two. Obviously if I give any one of the 3 more weight, then a student could do even less well on the least weighted portion and still earn an A. I tried taking the geometric mean rather than the arithmetic mean, but that did not help much.

Solution 1: My first solution was to multiply the grades rather than add them. Then getting anything less than 90 on one portion (and 100 on the other two) lowered the grade to a B or less. This works ok.

Solution 2 was motivated by our campus health incentive: if you walk 1,000,000 steps, you get a $50 bonus. A colleague pointed out that neuroeconomic studies suggest that the incentive would be more effective if everyone got $50 bonus in January and if you did NOT walk 1,000,000 steps have $50 deducted at year end. Now on day 1, I tell the students they all have 1,000 points in the class. 900 points and above is an A. For each class they miss, they lose 33 points. For each unsatisfactory homework assignment, they lose 33 points. If they don’t do the class project adequately they lose up to 400 points. This has been more successful.

In this roundtable, we will discuss these approaches and the issues they raise. For example, do students “earn” an A? If so, what is there attitude when they start out with 1,000 points and an A? Will changing terms will promote a better attitude and expectation to active learning. Rather than use the terms Teacher and Teaching Assistant, I am experimenting with using the terms Coach and Assistant Coaches.

Investigative learning in undergraduate biology labs  
Alita Burmeister, Yale University

Inquiry- and research-based courses allow undergraduate students to directly experience more of the scientific process than traditional labs. Such courses vary from nationally-organized initiatives to university-wide coursework to researcher-specific topical courses. Objectives of this round table are to: 1) Work in groups to identify key components of inquiry- and research-based labs; 2) Discuss how these components vary across institutions and departments; 3) Identify how budget constraints and different student populations may
influence inquiry and research in the classroom. This session is designed for all laboratory instructors, including both those experienced with as well as those new to investigative learning.

**Developing Resources and Programs for Pre-Health Students**
Laura Salem and Annie Lee, *Rockhurst University*

At Rockhurst University, we have a large population of students interested in health care careers. We have developed resources to share with these students to help them become more successful in their application and interview process. We will share our ideas, stories, and challenges as Pre-Health directors at Rockhurst.

**9:00- 9:40AM SATURDAY SESSION**

**Re-envisioning a Comparative Physiology Course**
Christina Wills, *Rockhurst University*

After the completion of curriculum reform in 2016, Rockhurst University's General Physiology course was transformed from a test centered mammalian (primarily human) physiology course into a writing intensive comparative physiology course. Previously, pre-health/biology major students enrolled in both General Physiology and Advanced Human Anatomy. The new curricular changes allowed biology majors to use Human Anatomy and Physiology I and II courses to fulfill major requirements. General Physiology was revised to be a comparative course that covered plant, fungal, and animal (invertebrate and vertebrate) physiology. In this new design, human physiology was briefly introduced while the focus of the class was on non-human species. This new design focused on two course objectives: develop a basic understanding of the physiological processes governing osmoregulation/water balance, energetics/nutrition, response to the environment, and reproduction in plants, fungi, and animals and critically analyze and articulate scientific information in writing and via a poster presentation. Students were assigned: a weekly writing task that focused on writing to diverse audiences, three literature reviews (plants, fungi, and animals), and a final poster presentation on a topic not covered in the course. A survey on student perceptions of reading scientific literature and scientific writing skills was administered on the first and last days of class. Literature reviews were graded with a rubric emphasizing analysis and synthesis of concepts from primary literature. As part of program assessment, literature reviews were also assessed, but not graded, with the Association of American Colleges and Universities’ written communication VALUE rubric.

**Teach like a pro in your first years.**
Becky Burton, *Alverno College*, Conrad Toepfer, *Brescia University* and Jason Wiles, *Syracuse University*

Which educational innovations have been validated and which have not? How can you maximize cooperation of students, peers, and administrators as you implement the best in innovative pedagogy? Where can you find excellent “turn key” activities? Master teachers will lead a discussion on these and other topics. Bring your questions.

**Incorporating meaningful learning experiences**
Holly Nance, *College of Coastal Georgia*

In an effort to create meaningful learning experiences for students, I have worked to incorporate assignments that promote outreach education and a sense of purpose into my courses. I offered an upper-level Service-Learning (S-L) course aimed at promoting science outreach education, which required my students to develop
lectures and activities aimed at 7th grade biology students on marine conservation. Overall, my students gained a deeper understanding and appreciation of the course topic, primarily due to the experiential learning and community outreach aspect of the assignment; they could see the value in their efforts by receiving feedback from the 7th graders. Given the positive response from students in this S-L course, I would like to incorporate similar assignments aimed at providing students with a purposeful, impactful application of course content. In introductory biology courses, it can be difficult to develop such assignments. This semester, I am assigning my introductory biology students to create Public Service Announcement (PSA) posters that will highlight a current issue (e.g., conservation status, human health impact, environmental impact) associated with a specific taxon of their choice. This assignment is intended to provide students with the opportunity to explore a taxonomic group in more depth than class time allows, exercise their creativity, and potentially make a difference by promoting awareness of an issue related to a taxon they find interesting. I hope to partner with local schools and/or local environmental agencies who will display the students’ posters at their institutions. I would like to lead a round table discussion aimed at developing similar assignments that provide a meaningful learning experience AND can be incorporated into introductory/core biology courses. These types of assignments have the potential to promote student engagement, intrinsic motivation to excel in the course, and student retention in the major.

80 minute Presentations

1:15-2:35PM FRIDAY SESSION

Entering Research: A Curriculum to Support Undergraduate and Graduate Research Trainees
Janet Branchaw, University of Wisconsin-Madison

The Entering Research curriculum includes 95 field tested activities and resources to support STEM research trainee development in seven areas that have been shown to contribute to trainee retention and advancement, and diversification of the scientific research workforce. The workshop is for research training program directors and academic department faculty members who support undergraduate researchers as they navigate their research experiences. Participants will be given access to the curricular materials and learn how to use them to build new or customize existing courses and workshops to support research trainees.

Hands-on Gross Anatomy Review and Tutorial
Diane Novotny, Marquette University

Join us in Marquette’s Gross Anatomy Laboratory for an extended hands-on gross anatomy experience. The session begins with an informative presentation about what will be shown, our working gross laboratory, cadavers and the donation process. This presentation is to prepare visitors for the profound experience of visiting any gross anatomy laboratory. Once in the lab, our instructors and teaching assistants will take you through different stations where visitors are able to touch and ask questions about the dissections and specimen being shown. There will even be time to explore on their own. The pre-pared stations will cover these regions of the body: upper extremity, lower extremity, abdomen, thorax and lastly brain and spinal cord specimen.

Addressing Student Misconceptions with Interactive Models: Flow of Genetic Information and Cell Division
Margaret A. Franzen, Milwaukee School of Engineering, Dina L. Newman, and L. Kate Wright, Rochester Institute of Technology
Kits used in the workshop are suitable in introductory biology courses, and advanced topics can be explored using the models in advanced cell biology and genetics courses. Learn about the CREST program, in which educators collaborate with CBM staff to develop instructional materials and study the impact of the materials on student learning. All models used in the workshop are available for loan from the MSOE Model Lending Library; borrowers only pay return shipping costs.

4:05-5:25PM FRIDAY SESSION

Nighat P Kokan 1, Teresa M Holzen2, Emily Rader1, Tyler Grisar1, and Frederik Benzon1
1Cardinal Stritch University and 2Mount Mary University

The Genomics Education Partnership (GEP) is a consortium of faculty from more than 100 colleges and universities across the United States who are including bioinformatics tools and techniques in Course-based Undergraduate Research Experiences (CUREs). The greater biological question that has been addressed is a comparative study of the evolution and function of the Drosophila Muller F element (dot chromosome), an unusual domain which is packaged as heterochromatin but has a normal gene density. One way GEP students contribute to this study is through manual gene annotation of several Drosophila species using bioinformatics tools such as NCBI BLAST and publicly available databases such as FlyBase and UCSC Genome Browser (GEP UCSC mirror site). Genome annotation, identifying features in raw genomic DNA, is a labor-intensive procedure. As students learn to annotate genes, they become proficient in the use of computational tools, they learn to apply different lines of evidence to support a gene model, and they provide novel contributions to scientific databases and ongoing scientific inquiry. In this workshop, two GEP faculty and three GEP students will guide participants through the steps of manual gene annotation. Participants will use bioinformatics tools and databases to identify putative genes in genomic sequence from a Drosophila species using Drosophila melanogaster as the reference sequence. Once orthologous genes are identified, participants will identify possible isoforms, start codons, exons, introns, splice donor/acceptor sites, and stop codons for these genes. Faculty and student insights and experiences with the GEP and CURE will also be discussed.

Genetic medicine frontiers: Using HHMI Biointeractive Resources to Teach Current and Future Research in Gene Therapies and Early Success Stories
Alexandra Fairfield, HHMI Biointeractive and Montgomery College

This workshop is anchored on a hands-on activity to review the Central Dogma of Gene Expression: DNA->RNA->Protein. At each step of the gene expression process there are classroom resources created by HHMI BioInteractive teams to show the latest research on correcting gene or gene expression errors. Interventions include CRISPR, viral gene delivery, exon-skipping with RNAi, and small molecule drug therapies. Video clips of gene therapy pioneers will explain early successes in the treatment of Leber’s Optical Neuropathy, Cystic Fibrosis, and Duchenne Muscular Dystrophy. HHMI Biointeractive provides classroom-ready materials free of charge for educators teaching a wide range of biology topics, from genetics to ecology.

Using Kits to Enhance Learning and Shorten Grading Time
Mary Holland, B.A.C.K. for Learning
If you have ever asked yourself any of the following questions...you may be a Biology Professor.

1. We just covered this last week, why don’t they remember?
2. How can I help my students make the connection between related concepts?
3. There must be a better way to teach this topic?
4. I just finished grading labs, why is this pile of ungraded labs still here?

As a Biology Professor, I asked all these questions at one time or another. This drove me to design kits, build curriculum and change the way I taught. Come explore what BACK for Learning is all about in this fun, interactive workshop.

9:50-11:10AM SATURDAY SESSION

Conserving Panda Populations through Understanding their Reproductive Endocrinology
Ian Harwood and Ingrid Miller, Bio-Rad Laboratories - Bio-Rad Explorer Program

Save the Giant Pandas! Learn about the effect of reproductive hormones, immunological responses and ecosystem balance by engineering a hormone detection system for Giant Panda population conservation efforts.

The integrated nature of the biology concepts covered by this workshop is useful in building curricular bridges to other content areas you may teach. Connections can be made to ecology, survival and fitness, climate change, and the inter-relatedness between body systems, among others. The Giant Panda Problem workshop covers those processes in the context of biological systems using free energy and the interaction of biological systems. The inquiry-based curriculum of Bio-Rad’s Giant Panda Problem workshop integrates immunity and reproductive endocrinology into a single laboratory activity and provides the opportunity for you to help your students discover that body systems are connected in a genuinely engaging context. This session is specifically designed to demonstrate connections to the AP Biology framework and also applies to the AAAS and NSF’s Vision & Change.

Participants will come away with an understanding of how to use a single assay to study two body systems - reproductive endocrinology and the immune system. They will understand the ecological context that has negatively impacted Giant Panda populations; learn how an Enzyme Linked Immunoassay (ELISA) detects the presence of particular antigens or antibodies; be able to design an ELISA model that specifically detects a reproductive hormone; and determine the reproductive state of female Giant Pandas by analyzing hormone levels. The workshop features Bio-Rad's Giant Panda Problem Kit for AP Biology.

The Science and Ethics of CRISPR-based Genome Editing
Tim Herman and Margaret A. Franzen, Milwaukee School of Engineering

The MSOE Center for BioMolecular Modeling is engaged in a new project to create hands-on instructional materials focused on CRISPR Gene Editing technology. These student-centered materials have been designed to engage students in a deep and thoughtful consideration of both the historical context in which CRISPR technology has been discovered as well as the technical aspects of the CRISPR system that sets it apart from previous approaches to manipulating gene sequences.

This workshop will feature several new instructional tools that have been created in the past year including:

- A collection of nucleosome models – leading to a discussion of epigenetics
- Models related to the Bcr-Abl chromosomal translocation that results in CML (chronic myelogenous leukemia)
• A paper bioinformatics activity focused on the initial report of the CRISPR locus in bacteria
• Schematic models of the CRISPR Cas9 protein as well as accurate 3D printed models of Cas9 based on atomic coordinates of solved structures

In addition to these materials that address basic concepts of CRISPR biology and the application of this technology to editing human genomes, we will also discuss ongoing efforts to use other CRISPR proteins in the sensitive, rapid and accurate detection of pathogens to stop the spread of disease in remote health care settings.

The materials explored in this workshop can be used in introductory biology and microbiology courses. These same materials support the exploration of more advanced topics such as the use of modified CRISPR proteins to alter specific gene expression and to edit the genomes of eukaryotic organisms, including humans. Participants will also learn about the CREST program (Connecting Researchers, Educators and Students), in which educators collaborate with CBM staff to develop instructional materials and study the impact of the materials on student learning. All models used in the workshop are available for loan from the MSOE Model Lending Library.

Posters:

1-Assessing the Genetic Literacy of Nursing Students
Melissa Haswell, Davenport University

Presently, genetics is not a required component of the curriculum for nursing students in the United States. However, a basic understanding of genomic medicine is essential for twenty-first century nursing practice. Current research in genetics has led to discoveries of the genetic aspects of many diseases, drugs, and cancer therapies, as well as prenatal and genomic disease testing. Further, recognition of possible genetic disorders may improve a nurse’s patient intake skills. Therefore, it is essential that educators assess the genetic knowledge of students enrolled in biology courses for nursing students in order to improve the nursing curriculum, as well as promote alignment of nursing education with Vision and Change guidelines. Evaluation of the genetic literacy of nursing students admitted to a Bachelor of Science nursing program occurred while taking pathophysiology, the final biology course required in their program using the Genetic Literacy Assessment Instrument at a private university in the Midwest. This poster presentation will provide the preliminary results of this ongoing study.

2-Teaching Sustainability
Christine Bezotte, Elmira College, and Giacomo Berceli, Marco Polo Program

This course is intended to provide students with an introduction to sustainable agriculture. In the USA and Italy students evaluate, the acquisition and preparation of foods related to cultural and environmental norms. Both on campus and “in the Field” students study the meaning of common dietary concepts [Organic, Natural, Paleo and Sustainable]. They analyze foods nutritional and economic value and components. They investigate the ways in which the peoples, culture and economics of Italy have adopted and thrived.

The course is also a social history course studying how the culture and society of Italy have been heavily influenced by their physical environment. At the same time, the course has a scientific influence. The class asks questions that integrate the natural and physical sciences, social sciences, and humanities. Students use the scientific method to evaluate the nutritional content of foods and diet, environmental impacts of growing foods,
and their acquisition and processing, through articles, laboratories and cooking preparation classes. Students also participated in labs to evaluate nutritional content and tastings of foods.

Time Our College was planned for local visits/tours/short films regarding agriculture. It is expected that students will have an introductory level of knowledge of diet and nutrition prior to visiting Italy. They will be acquainted with the concept of certain farms/regions and ecosystems they will observe. Based on readings and discussions they evaluated differences between USA’s and the Northern Region of Italy’s culture.

Student travels and connections in Italy exposed students to a better understanding of how the culture and economic status of the peoples has developed [from the recent past to present] with a significant connection with the environment. Written evaluations/comparisons by the students will be presented.

3-Using “Study Group Selfies” to encourage consistent study group attendance leads to improved course performance.
Amy K Hebert and Merrilee F Guenther, Elmhurst College

Human Anatomy and Physiology I, a course geared towards first year nursing and health professions students, is a rigorous course that tends to be a struggle for many students. Learning a great deal of new material, while also developing strong study habits, poses a challenge that many students have difficulty overcoming. In an attempt to help students better prepare for exams and improve their overall performance, we introduced incentives for participating in study groups with fellow classmates. Following exam 1, students were offered 1 point per weekly study group meeting with the opportunity for up to 10 points. Students emailed time stamped “study groups selfies” to show their participation in study groups outside of class time. Here we examine the impact these study groups had on exam and course grades of students who participated in study groups versus those who did not, as well as the student’s overall attitudes on incorporating these groups into their study habits. Student participation in study groups was a positive experience which helped keep students on track with their material, while also improving overall performance in the course. By providing students with an incentive, either extra credit or required, to develop positive study habits early in their college career, we can help students develop good habits that will set them on a path to success in their subsequent coursework. We can also ensure that they recognize the value of working in groups, which ultimately strengthens the learning community.

4-Inquiry based laboratory exercises using yeast prions
Anita Managoran, Marquette University and Gregory Smith, Lakeland University

Lab based courses in Biology have traditionally focused on tried and true lab modules in which students follow a prescribed protocol to generate predictable data that can be analyzed and written up as lab reports. While valuable for teaching concepts in biology, these experiences also leave students with misconceptions about laboratory-based research. Here, we describe laboratory courses that engage both freshman students and upperclassmen at two different institutions in inquiry based research. The courses introduce students to basic laboratory techniques which are then applied in a mini-research project based on ongoing research of a lab at a research institution, understanding the cellular mechanisms that contribute to the formation of misfolded proteins that form cytoplasmic aggregates called prions. Yeast (Saccharomyces cerevisiae) prions are a tractable system to use because there are distinct colony phenotypes and fluorescent microscopy assays that are both easily quantifiable by students. Using primary literature and the extensive information database provided by the yeast community (yeastgenome.org), students develop a hypothesis and identify a genetic or environmental factor which alters the rate of prion formation. Student groups then design, perform, and troubleshoot
experiments to assess their hypothesis. The course culminates in either a final poster presentation or lab report. The design of the courses will be presented along with short term and long term outcomes including student persistence in STEM fields.

5-The REFLECT Project: Redesigning Education for Learning through Evidence and Collaborative Teaching.
Tara Prestholdt, Carolyn James, Eric Anctil, Heather Dillon, and Stephanie Salomone, University of Portland

The goal of this project is to address the national call for improved learning environments for undergraduate students in science, technology, engineering, and mathematics (STEM) classes by implementing a new framework for instructional change at the University of Portland. Participating faculty will learn to incorporate research-informed pedagogical practices that favor active learning. Ongoing support for sustaining these new instructional practices will be fostered within cohorts of faculty as they engage in a reflective process of regular peer observation. This model for supporting instructional change through shared practice will leverage institutional values that prioritize high-quality teaching and collaboration, making it applicable to other regional, comprehensive universities where reflective instruction is paramount. The resulting instructional changes will improve the retention and success of STEM students while shaping the institutional culture of teaching in a lasting way.

6-Evaluation of a Pre-/Post-Test for Assessing Student Learning in an Introductory Biology Course
Scott M. Shreve, Lindenwood University-Belleville

Classroom assessment of student learning is necessary in gauging the effectiveness of an assignment or of the overall course in helping students attain mastery in course learning objectives. A rigorous assessment plan can also be used to evaluate any pedagogical changes or innovations a teacher introduces to the classroom. Pre- and post-testing is common assessment tool to document student learning after an intervention (e.g. Cramer & Mahoney, 2001; Gosselin & Macklem-Hurst, 2002; Milner et al, 2012; Duran et al, 2014; Taylor & Marsden, 2014; but see Rosenberg, 2017; Spurlock, 2018). I am developing pre-/post-tests as a central part of assessment plans for two courses: a first-year introductory biology course for majors, and an upper-level evolution course. Here I present data from the first semester of the pre-/post-test in the introductory biology course. Students showed an average improvement of 33.9 percentage points (paired t-test, t = 8.193, p < 0.0001) from the beginning to the end of the semester. The post-test was able to reliably discriminate the degree of mastery of course content among students (KR20 = 0.804), and was significantly correlated with final exam performance. Each question on the pre-/post-test is linked to one or more course learning objectives, and student scores showed significant improvement in all course learning objectives covered by the test. However, scores on the post-test were not significantly correlated with scores on final exam questions covering three of the six course learning objectives. The results of the first semester using pre-post test show that, overall, it is effective in assessing student learning. Closer analysis does show several the test could be improved by revising some questions and adding questions covering concepts that were emphasized in the course exams but not included on the pre-/post-test.

7-The Strategic Undergraduate STEM Talent Acceleration INitiative (SUSTAIN): Early Findings
Jason R. Wiles, John W. Tillotson, and Karin Ruhlandt, Syracuse University

The "Strategic Undergraduate STEM Talent Acceleration Initiative" (SUSTAIN) project at Syracuse University addresses the challenges of recruiting and retaining high-achieving, low-income students from diverse backgrounds into undergraduate STEM programs. The SUSTAIN program has awarded 28 $10,000 scholarships per year for the first two years of the college experience. It provides a coherent system of academic, social, and career support services strategically designed to enhance the success of biology and chemistry students during
their first and second years of undergraduate study. Program goals include retaining at least 90% of the initial cohort of 28 scholars as intended or declared STEM majors following their freshman year, and to retain at least 80% of these students as declared STEM majors following their second year of participation in the SUSTAIN program. The program has established a STEM faculty professional development workshop designed to foster the implementation of cutting-edge instructional practices that support dynamic, active learning approaches in introductory STEM courses. Scholars have been provided “360 degree wrap-around support” programming that is responsive to their evolving academic, social, and career development needs as they move through their first and second years. Research efforts are investigating the socialization experiences of scholars throughout the program to examine the efficacy of the multi-faceted series of intervention supports to assess their impact on the future STEM trajectories of students. Findings from this project include an over 90% retention rate for the first year, as well as identification of promising approaches and areas for program refinement toward the development of a sustainable model for providing wraparound academic and social support services to STEM majors that can be replicated on other campuses.

8-Effect of a 6-Week Biology Course on Scientific Engagement and Literacy in High School Students

Mitchell Spring, Kelsey Benton, Elizabeth Doncheck, Matthew Herbst, Deborah Joye, Brian Maunze, and Anna Miller, Marquette University

Eighteen high-school students participated in a six week introduction to biology course team taught by neuroscience graduate students. Each three hour lecture comprised equal parts lecture and lab time. The goals of the course were to increase basic knowledge about the meaning of the scientific method and how to employ it, establish an intellectual foundation for basic biological principles, and foster an interest in biology and science. Lectures covered the following topics: the scientific method, genetics, cell biology, tissue, organs, and evolution. Lab activities were paired thematically with lecture content; they included DNA extraction from different fruits and vegetables, visualizing plants and animal tissue using light microscopy, and electrophysiological recording from earth worms. At the beginning and end of the six week course, students were given surveys assessing both general biology knowledge and attitude towards science and biology. General knowledge was assessed with nine short answer questions (e.g. "What is the central dogma of biology?" and "Why does the body have different types of tissue?"). Following the short answer questions students indicated their level of agreement (along a 5 point scale) with 17 statements about biology as a discipline (e.g. "I feel confident answering questions about biology.") and a career (e.g. "I am interested in a career in a medical profession.") Attitudes toward science did not change over the course of the study: p > 0.05 for repeated measures t-tests of each statement. Nor did biological knowledge increase substantially for most questions. Ideas for improving both student engagement and assessment of course efficacy are considered. Furthermore, this course was developed only three years ago, and is primarily administered by a team of graduate students. As such, professional input on how to best improve engagement, course efficacy, and assessment of both is sought and appreciated.

9-Drawing to Learn…. but do students know how?

Laurieann Klockow, Marquette University

A Drawing to Learn framework for using drawing to promote model based reasoning in biology has been published (Quillin et al 2015 CBE Life Sci Edu 14(1):es2). Many instructors who teach microbiology use drawing as a pedagogical method and yet whether students know how to use drawing as a learning strategy or whether drawing leads to better problem solving has yet to be tested. I use drawing frequently when I teach immunological concepts in my microbiology course and am investigating whether this is an effective strategy. This study explores two major questions: (1) does modeling how to use drawing to help problem solve increase student appreciation for and motivate students to use drawing as a learning strategy and (2) does drawing help
students perform better on exam problems? My hypothesis is that modeling how drawing can be used to problem solve will increase students’ use of drawing as a study tool and a problem solving tool on exams, leading to better exam performance. The findings from this project will inform the development of future classroom activities.
See you next year at ACUBE’s 63rd Annual Meeting at Syracuse University
Syracuse, New York
October 18-19, 2019

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