24th Annual
American Society for Microbiology
Conference for Undergraduate Educators

July 27-30, 2017
Sheraton Denver Downtown
Denver, Colorado

#ASMcUE

ASMcue.org

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THURSDAY, JULY 27

2:00 PM – 8:00 PM
ASM Conference Registration Desk Open

3:45 PM – 4:00 PM
Conference Welcome and Opening Remarks

4:00 PM – 5:00 PM
Opening Plenary Lecture – pg. 21
Whole Genome Engineering: An Introduction
Andrew Hessel, Autodesk, Inc., San Francisco, CA

5:00 PM – 5:30 PM
Welcome from ASM – pg. 21

5:30 – 6:30
Dinner and Travel Award Recognition – pg. 21

6:45 PM – 8:25 PM
Concurrent Education Sessions – pg. 21

8:30 PM – 9:30 PM
Welcome Reception* – pg. 22

*Sponsored by Pearson

FRIDAY, JULY 28

7:00 AM – 8:00 PM
ASM Conference Registration Desk Open

7:00 AM – 7:45 AM
Networking Breakfast by Topical Areas – pg. 26

7:45 AM – 9:25 AM
Concurrent Sessions – pg. 26

7:45 AM – 8:15 AM
Incorporating the ASM Concept Inventories into Your Course Design
7:45 AM – 8:15 AM
Mentoring the Mentors: The Impacts of a Mentoring Web on STEM Student Success

7:45 AM – 8:15 AM
Challenges Facing Microbiology in the Nursing Curriculum

8:20 AM – 8:50 AM
Evidence-Based Methods to Improve Student Learning in the Life Sciences
8:20 AM – 8:50 AM
Characterization of Undergraduate Teaching and Learning Assistant Instructional Practices in the Context of an Introductory Cell and Molecular Biology Course

8:20 AM – 8:50 AM
Preliminary ASM Guidelines and Toolkit Supporting Microbiology in the Nursing Curriculum

8:55 AM – 9:25 AM
Professional Development Isn’t Just for Teachers: Preparing Your Undergraduate Teaching Assistants Too!
8:55 AM – 9:25 AM
Discussion: Supporting Microbiology in the Nursing Curriculum

9:35 AM – 10:05 AM
Using Scientific Teaching Methods to Improve Learning and Your Own Life
9:35 AM – 10:05 AM
Using Quantitative Reasoning and Quantitative Literacy Skills

10:10 AM – 10:40 AM
An Undergraduate Teaching Lab Focused on CRISPR
10:10 AM – 10:40 AM
Natural Selection in the Ebola Outbreak: Integrating Multimedia and Primary Literature into Undergraduate Biology Education

10:45 AM – 11:15 AM
Using Scientific Teaching Methods to Improve Learning and Your Own Life
10:45 AM – 11:15 AM
Virus Hunters: Fostering Critical Thinking through Quantification and Data Interpretation

11:30 AM – 12:30 PM
Concurrent Scientific Sessions – pg. 32

11:30 AM – 12:30 PM
Evolution of Arbovirus Infections: Diseased Vertebrates, Healthy Mosquitoes
Andrews Vázquez-Torres, University of Colorado, Boulder

12:30 PM – 2:00 PM
Lunch – pg. 33

12:30 PM – 2:00 PM
Dissemination Station Resource Fair – pg. 34

Tweeters and Instagrammers, your attention please!

The official hashtag of the Conference is

#ASMCUE

Come and join the conversation!
FRIDAY, JULY 28 (continued)

12:30 PM – 2:00 PM
Art Walk – pg. 33

12:30 PM – 2:00 PM
Job-Seeking Lounge – pg. 34

12:30 PM – 2:00 PM
JMBE Office Hours (By Appointment Only – Sign-up at Registration Desk) – pg. 33

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REIL/Biology Poster Session – pg. 33

12:30 PM – 2:00 PM
PARE Group Meeting (For Current and Past PARE Instructors) – pg. 33

2:00 PM – 3:00 PM
Consentient Scientific Sessions – pg. 35

2:00 PM – 3:00 PM
Metabolic Engineering of microbes for Production of Green Fuels and Chemicals
Calvin Henard, National Renewable Energy Laboratory (NREL), Golden, CO

3:00 PM – 6:00 PM
Exhibitor and Poster Setup – pg. 35

3:15 PM – 4:55 PM
Consentient Education Sessions – pg. 35

3:15 PM – 3:45 PM
Helping Students Succeed: FYE Across the STEM Curriculum

3:15 PM – 3:45 PM
Microbiology at NREL

3:15 PM – 3:45 PM
Student Learning: A Global Perspective

3:15 PM – 3:45 PM
The PULSE Program: An Overview

3:50 PM – 4:20 PM
Navigating the Challenges of Effective Teaching and Learning at Today’s Community Colleges

3:50 PM – 4:20 PM
Microbiology in a Brewery

3:50 PM – 4:20 PM
Student Learning: Diversity and Inclusion

3:50 PM – 4:20 PM
Catalyzing Change Within Your Department Using the PULSE Ambassador Program

4:25 PM – 4:55 PM
Considering Students’ Spatial Reasoning When Deciding the Types of Models (2D vs. 3D) to Teach Molecular-Level Processes

4:25 PM – 4:55 PM
Microbiology in Industry

4:25 PM – 4:55 PM
Disciplinary-Based Education Research in Community Colleges

4:25 PM – 4:55 PM
Using the PULSE Snapshot Rubrics to Assess Alignment with the Vision and Change Recommendations

5:15 PM – 6:15 PM
Plenary Lecture – pg. 38

Institutional Transformation: Models and Strategies of Institutional Change in Practices for Undergraduate Teaching and Research
Sylvia Hurtado, UCLA Graduate School of Education & Information Studies

6:30 PM – 8:30 PM
Exhibit Opening & Reception – pg. 38

SUNDAY, JULY 30

7:30 AM – 9:00 AM
Breakfast on Your Own

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Networking Breakfast by Location – pg. 41

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Focus Group – pg. 41

7:15 AM – 7:45 AM
Pearson (By Invitation Only)

8:00 AM – 9:00 AM
Plenary Lecture – pg. 41

Understanding the Evolution of the Host-associated Microbiome
Se Jin Song, University of California, San Diego

9:00 AM – 3:30 PM
Exhibitor Hall Open – pg. 41

9:15 AM – 10:15 AM
Poster Session A – pg. 41

9:30 AM – 10:00 AM
Product Corner – pg. 44

9:30 AM – 10:00 AM
Product Corner – pg. 44

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Product Corner – pg. 44

9:30 AM – 10:00 AM
McGraw-Hill Education

9:30 AM – 10:30 AM
Product Corner – pg. 43

MiniOne Systems
## MICROBREW SESSION I OF III
### SATURDAY, JULY 28

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<th>Tower Court D</th>
<th>Silver</th>
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<th>Denver</th>
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</thead>
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### MICROBREW A: 11:30 AM – 11:45 AM
- **Next-Gen Genome Solver: From Training to Community Science Projects**
  - **Gaurav Arora**, Gallaudet University

- **Engaging the Sense of Touch in the Classroom**
  - **Jeremy Chandler**, University of Tennessee

- **Problem-Based Microbiology Capstone Course**
  - **Rachel Watson**, University of Wyoming

- **Home Kitchen Microbiology – A Sourdough Bread-Baking Project and Blog**
  - **Tina Salmassi**, California State University, Los Angeles

- **Case-Based Methodology for Effective Student Development of Concepts and Quantitative Analyses**
  - **Rodney Anderson**, Ohio Northern University

- **3D-Printed Models to Help Students Learn How Antibodies Bind to Epitopes on Antigens**
  - **Erica Suchman**, Colorado State University

- **Introducing Troubleshooting to Undergraduate Laboratory Settings Promotes Critical Thinking and Problem-Solving Skills**
  - **Nina Martin**, Johns Hopkins Bloomberg School of Public Health

### MICROBREW B: 11:50 AM – 12:05 PM
- **Mining the Immune Epitope Database to Investigate Cross-Reactive Epitopes between Zika Virus and Myelin Basic Protein**
  - **Huda Makhluf**, National University

- **Math of Microbiology: An Approach to Increase Math Skills in Undergraduate Science Majors**
  - **Jason Baker**, Missouri Western State University

- **An Active Learning Approach to Reading the Primary Literature: Designing and Implementing a Bacteria and Bacterial Infections Online Course Using a “Pet Pathogen”**
  - **Elise Mosser**, Drexel University College of Medicine

- **Specs Grading: Motivating Students While Simplifying Grading**
  - **Jennifer O’Connor**, Rose-Hulman Institute of Technology

- **Developing Interrupted Case Studies to Increase Student Interactions with Real Data and Primary Literature Sources**
  - **Michele Culumber**, Weber State University

- **Effective Methods for Implementation and Evaluation of Game-Based Learning (GBL) for Micro**
  - **Carla Brown**, Drexel University College of Medicine

- **Introducing Troubleshooting to Undergraduate Laboratory Settings Promotes Critical Thinking and Problem-Solving Skills**
  - **Revati Masilamani**, Tufts University School of Medicine

### MICROBREW C: 12:10 PM – 12:25 PM
- **Infectious Disease Outbreak and Herd Immunity Simulation – With a Visual Appeal**
  - **Johanna Schwingel**, St. Bonaventure University

- **An Interdisciplinary Laboratory Experience for Microbiology and Physics Students**
  - **Matthew Domek**, Weber State University

- **Stressing Escherichia coli to Educate Students about Research: A CURE to Investigate Multiple Levels of Gene Regulation**
  - **Celeste Peterson**, Suffolk University

- **Decreasing the Barrier Imposed on Learning by Multiple-Choice Exams**
  - **Timothy Paustian**, University of Wisconsin–Madison

- **Adaptation of Small-Group Case Studies for Use in Larger (>75 Students) Classroom Settings**
  - **Michaela Gazdik Stofer**, Utah Valley University

- **The Meselson-Stahl Experiment: An Activity Using Models for DNA Replication to Predict Experimental Results**
  - **Nickie Cauthen**, LaGrange College

- **Use of a Reading/Writing Assignment Based on Popular Literature to Engage Students in Introductory Microbiology**
  - **Tracy O’Connor**, Mount Royal University
## Microbrews at a Glance

### MICROBREW SESSION II OF III
**SATURDAY, JULY 28**

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<tbody>
<tr>
<td><strong>MICROBREW D: 2:30 PM – 2:45 PM</strong></td>
<td>Implementation of a Learning Assistant Program in an Introductory Biology Course for Pre-Nursing Students in a Small Liberal Arts College – Will it Help Underrepresented Students Succeed? Vicki Isola, Hope College</td>
<td>Formative Assessment for Online and Hybrid Classrooms Krys Adkins, Drexel University College of Medicine</td>
<td>The Flipped Classroom in Veterinary Pre-Clinical Sciences: Student Engagement, Performance and Satisfaction Sarah Frankland, The University of Melbourne</td>
<td>Using Role Play to Enhance Student Comprehension of Cellular Respiration Katherine Marsh, El Camino College Compton Center</td>
<td>Comparing Apples and Oranges: An In-Class Activity to Help Students Appreciate the Diversity of Bacteria and the Gram Stain J. Jordan Steel, Colorado State University, Pueblo</td>
<td>Peanut Butter Protocols: Incorporating a Favorite Snack to Improve Communication Olivia Long, University of Pittsburgh at Greensburg</td>
<td>Engaging Students in Real-World Applications and Research Projects Sharon Gusky, Northwestern Connecticut Community College</td>
</tr>
</tbody>
</table>

| **MICROBREW E: 2:50 PM – 3:05 PM** | Bite-Sized Mentoring For Bite-Sized Research: Creating Undergraduate/High School Partnerships for a Short, Course-Based Authentic Research Module Elizabeth Genné-Bacon, Tufts University School of Medicine | Cultivating Perseverance Through Study Plans Robert Maxwell, Georgia State University | Turn on Your Electronic Devices: Embracing Technology to Improve Student Engagement during Active Learning! Samantha Parks, Georgia State University | It’s All Fun and Games in Immunology??!! Shannon McQuaig-Ulrich, St. Petersurg College | Microbes in the News: Using Popular News to Explore Microbes and Their Intersection with the World Alexandra Walczak, Rutgers, The State University of New Jersey | The Science of Pickles: A Discovery-Based Microbiology Lab Redesign Alice Lee, North Carolina State University | How to Create a Superbug: New Laboratory Modules to Expand upon a Course-Based Research Experience Jennifer Larson, Capital University |

| **MICROBREW F: 3:10 PM – 3:25 PM** | Student-Driven Independent Research Investigations in an Introductory Majors’ Microbiology Laboratory Course Brinda Govindan, San Francisco State University | Lessons Learned from Organizing and Evaluating an Undergraduate Research Symposium Emily Nowicki, The University of Texas at Austin | Winogradsky’s Battery: Visualizing Electron Potential in a Sediment Column Craig Phelps, Rutgers, The State University of New Jersey | Microbiology Pictionary: An Engaging and Competitive Classroom Activity to Review Course Material Kara Mosovsky, Moravian College | Game Based Learning: Boardgames That Teach Biological Concepts Jamie Cunningham, Johnson County Community College | Using Hops to Implement Intercampus and Interdisciplinary Collaborative Research Projects for Undergraduates Kristen Swithers, Southern Connecticut State University | Antimicrobial Effectiveness of Holistic Oils Kenzi Brooks, Seminole State College of Florida |
## MICROBREW SESSION III OF III
### SATURDAY, JULY 28

### ROOM LOCATION

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### MICROBREW G: 3:45 PM – 4:00 PM

**Microbiology in a Hybrid Classroom: Is it Feasible, Rigorous and Credible?**

John Kyndt, Bellevue University

- Creation and Utilization of Concept Frameworks as a Course Guide
  - Margaret Richey, Centre College

**Creating Virus Web Sites**

Caitlin Reeves Williams, University of Georgia

**Mitosis and Meiosis in Motion: Students Playing the Part of Chromosomes, Spindle Fibers, and Nuclear Envelopes**

Lacy Cleveland, University of Northern Colorado

**Flipped Classroom Activities**

Mary Shawgo, Graceland University

- Addition of an Inquiry-Based Microbiology Research Project to the ‘Identification of Unknowns’ Laboratory in Order to Positively Impact Student Learning
  - Sean Coleman, University of the Ozarks

### MICROBREW H: 4:05 PM – 4:20 PM

**A Guided Exercise to Improve Scientific Literacy and Critical Analysis Skills**

Melissa Eslinger, United States Military Academy, West Point

- Development of a Virtual Laboratory Bacterial Unknown Assessment Tool
  - Tony Slieman, New York Institute of Technology College of Osteopathic Medicine at Arkansas State

**Use of ‘Kahoot!’ as an Online Assessment Tool in Microbiology**

Becky Aloo, University of Eldoret

**A Microorganism Profile Assignment to Engage Nursing Students**

Elizabeth Vaughn, Galen College of Nursing

**PowerPoint Books: An Alternative to Online Lectures**

Krys Adkins, Drexel University College of Medicine

**Using a Semester-Long Inquiry-Based Lab on Biofilm Formation to Teach the Scientific Method**

Amy Beemer, University of Cincinnati, Blue Ash College

**Keeping the Nursing Microbiology Lab Relevant: Low Cost Tablets as Photomicrograph Documentation and Electronic Record-Keeping Tools**

Amy Sprenkle, Salem State University

**Leveraging Classroom Response Systems for Both Readiness-Assessment and Collaboration in Introductory Classes**

Nancy Boury, Iowa State University

**iNaturalist: Creating Digital Biodiversity Collections in an Introductory, Inquiry-Driven Laboratory Course**

Kevin Floyd, The University of Texas at El Paso

### MICROBREW I: 4:25 PM – 4:40 PM

**A Model-Based Riboswitch Activity for Instruction on Microbial Gene Regulation**

Adam Kleinschmit, Adams State University

- Using Machine Learning to Explore Student Thinking in Constructed Responses – An Example of Enzyme Binding Structure and Function
  - Rachel Yoho, Michigan State University

**Keeping the Nursing Microbiology Lab Relevant: Low Cost Tablets as Photomicrograph Documentation and Electronic Record-Keeping Tools**

Amy Sprenkle, Salem State University

**Leveraging Classroom Response Systems for Both Readiness-Assessment and Collaboration in Introductory Classes**

Nancy Boury, Iowa State University

**Naturalist: Creating Digital Biodiversity Collections in an Introductory, Inquiry-Driven Laboratory Course**

Kevin Floyd, The University of Texas at El Paso
Welcome to Denver, Colorado and the 24th American Society for Microbiology Conference for Undergraduate Educators (ASMCUE)!

We are excited to have first-year and returning attendees from across the country and around the world come together in this interactive community focused on improving teaching and learning in the biological sciences. ASMCUE is known for its welcoming and collaborative environment; we hope that over the next few days you will connect with new colleagues in exciting and meaningful ways. We are proud to bring you an engaging program featuring scientific research and innovative teaching strategies.

We are excited to welcome four plenary speakers this year:

- **Andrew Hessel**, Autodesk, Inc.
- **Sylvia Hurtado**, UCLA Graduate School of Education & Information Sciences
- **Patricia Shields**, University of Maryland, College Park and recipient of the 2017 ASM Carski Foundation Distinguished Undergraduate Teaching Award
- **Se Jin Song**, University of California, San Diego

Our program features several new and returning highlights:

- Attend concurrent sessions focused on a wide variety of scientific, teaching and professional development topics including: diversity and inclusivity; community colleges; and workplace readiness.
- Take advantage of the third annual Dissemination Station Resource Fair and learn about grant-funded and non-profit efforts to improve student learning and mentoring in the life sciences.
- Enjoy refreshments, a sneak peak, and a meet-and-greet with film scientists and staff at HHMI Night at the Movies.
- Explore poster sessions featuring original, inventive teaching approaches and biology education research as well as Microbrew sessions highlighting best practices in microbiology and biology education.
- Show your institutional pride by wearing your school gear on College and University Spirit Day and represent your community by wearing an identifying color on Identify Your Community Day.

Thank you to our local steering committee, **Jennifer McLean**, Caroline Kulesza, and Heidi Smith and to our committee member-at-large Bryan Dewsbury. Thank you to the ASM staff for all they have done from putting together the location and the program to making sure everything runs smoothly throughout the conference. We hope that you will take a moment over the next few days to thank them for all of their excellent work!

ASMCUE offers so many opportunities to connect with colleagues and engage with new content and ideas. This is a community rich with ideas, energy, and enthusiasm for teaching and learning; we hope that you will leave CUE not only having learned something new, but having shared something as well. Thank you for being here and being part of our community—looking forward to an exciting ASMCUE 2017!

Sincerely,

Chair,
Amy Siegesmund
Pacific Lutheran University
Tacoma, Washington

Vice Chair,
Jeffrey Olimpo
University of Texas at El Paso
El Paso, Texas

Abstract Review Chair,
Jaclyn Madden
Harford Community College
Bel Air, Maryland

Microbrew Review Chair,
Ned Barden
MCPHS University,
Boston, Massachusetts
Conference Planning Committee

“Mile-High” Teaching and Learning: Promoting STEM Success for All Students
24th Annual ASM Conference for Undergraduate Educators
Sheraton Denver Downtown Hotel
July 27-30, 2017

ASMCUE STEERING COMMITTEE

Amy Siegesmund, Chair
Pacific Lutheran University, Tacoma, WA

Jeffrey Olimpo, Vice Chair
The University of Texas at El Paso, El Paso, TX

Jaclyn Madden, Abstract Review Chair
Harford Community College, Bel Air, MD

Ned Barden, Microbrew Review Chair
MCPHS University, Boston, MA

Caroline Kulesza, Local Steering Committee Representative
Fort Lewis College, Durango, CO

Jennifer McLean, Local Steering Committee Representative
Colorado State University, Fort Collins, CO

Heidi Smith, Local Steering Committee Representative
Front Range Community College, Fort Collins, CO

Bryan Dewsbury, Committee Member-at-Large
University of Rhode Island, South Kingston, RI

ABSTRACT REVIEW COMMITTEE

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Drake University College of Pharmacy and Health Sciences, Des Moines, IA

Amy Morris
Hastings College, Hastings, NE

Mark Randa
Cumberland County College, Vineland, NJ

Veronica Segarra
High Point University, High Point, NC

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Jerry Kavouras
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Suzanne Long
Monroe Community College, Rochester, NY

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Coordinator, Education Programs and Resources

Claire Wilson
Coordinator, Education Programs and Resources

American Society for Microbiology
Education Department
1752 N Street, NW
Washington, DC 20036
Email: asmcue@asmusa.org
Conference Steering Committee

Amy Siegesmund, Chair, is an associate professor in Biology at Pacific Lutheran University in Tacoma, WA. She holds a Ph.D. in microbiology from Washington State University and a B.A. in biology from Alverno College. Her current research focuses on student metacognition and learning; the use of self-assessment to increase metacognition; and student theories of intelligence, learning, and failure. She is an alumna of the Biology Scholars Research Residency (2010) and was a member of the ASM Task Force on Curriculum Guidelines. Amy was awarded the PLU Faculty Award for Excellence in Teaching in 2015.

Jeffrey Olimpo, Vice Chair and Assistant Professor in Biological Sciences at The University of Texas at El Paso (UTEP), is a discipline-based education researcher with more than five years of experience in the development, implementation, and evaluation of CUREs. His current research focuses on the cognitive and non-cognitive outcomes associated with novices’ participation in authentic research opportunities as well as the impact of professional development experiences on the career growth of graduate, postdoctoral, and faculty instructors. Dr. Olimpo serves as chair of the Department of Biological Sciences’ committee on curriculum development in the introductory biology series and likewise facilitates coursework on scientific teaching for upperclassmen, pre-service, and in-service teachers. He is currently PI and Co-PI on the NSF-funded Tigriopus CURE and ACSScellence scholarship programs, respectively, and is a Tips & Tools Section Editor for the Journal of Microbiology & Biology Education.

Jacklyn Madden, Abstract Review Chair, is an Assistant Professor of Biology and Academic Division Program Specialist at Harford Community College. She completed a Bachelor of Science in Biology at Saint Vincent College and a Master of Science in Biotechnology at Johns Hopkins University. She was a 2014-2015 ASM Assessment Residency Biology Scholar and a member of the 2015-2016 Quantitative Undergraduate Biology Education and Synthesis QB in Introductory Biology Faculty Mentoring Network. Her interests include embedding research activities in introductory biology and biotechnology courses, increasing the use of active learning techniques in introductory biology courses, and the effects of embedding first-year experience concepts in first-year science courses.

Ned Barden, Microbrew Review Chair, is an associate professor of microbiology at MCPHS University (formerly known as Massachusetts College of Pharmacy and Health Sciences) in Boston where he teaches Medical Microbiology, Advanced Microbiology with laboratory, the Environment and Public Health, and the Premedical and Health Studies Capstone Seminar courses and directs undergraduate research in microbial physiology and applied microbiology. Dr. Barden has also been a faculty member at the University of Mississippi and Eastern Michigan University, and has worked in and provided microbiology consulting services to private industry. He holds a Ph.D. and M.S. in Bacteriology from the University of Wisconsin-Madison and a B.S. in Bacteriology from Iowa State University of Science and Technology.
Bryan Dewsbury, Committee Member-at-Large, chairs the SEAS (Science Education and Society) research program at the University of Rhode Island (URI), which focuses on questions relating to identity constructs, bias, relationships, and the effects of those variables on learning in students (K-PhD). More specifically Dr. Dewsbury’s interest is in how students (especially those in underrepresented groups) develop perceptions of the world and others, and how these perceptions in turn affect their engagement with science content, career choices, and ultimately their academic performance. Central to the formation of these constructs are the presence of hidden biases, stereotype threat, and mindset. Dr. Dewsbury uses a variety of qualitative and quantitative methods to deduce the effects of these forces, and partners with local schools and with URI to implement interventions that have proven to be effective. Ultimately he is interested in helping to re-frame the education discussion to better address questions of equity and community-building, with the belief that the solutions to these questions are equally as important as student exposure to content. In the process, Dr. Dewsbury’s work addresses pressing issues such as student retention in STEM fields (especially in higher education), the under-representation of minority groups in certain STEM fields, and the role of affect domain in student learning gains. He also uses the results of our efforts to develop curricula that are more inclusive of these new understandings of what makes students successful.

Local Organizing Committee

Caroline Kulesza, Local Organizing Chair, is an Assistant Professor of Biology at Fort Lewis College, in Durango, Colorado. She holds a PhD in Microbiology from the University of Virginia, and a BS in Biochemistry from Penn State University. She was a 2016-2017 ASM Assessment Biology Scholar. At Fort Lewis College she teaches virology, microbiology and cell and molecular biology to undergraduates. She also trains students to conduct research on cytomegalovirus replication and pathogenesis. Her interests include developing research experiences embedded in introductory courses and strategies to improve the retention and persistence of underrepresented students in college.

Jennifer McLean, Local Organizing Chair, is an Assistant Professor in the Department of Microbiology, Immunology and Pathology at Colorado State University where she also received her PhD in vaccine immunology against tuberculosis. Her current research efforts are focused on the development and analysis of active learning strategies, the use of undergraduate learning assistants for high impact learning experiences, and infusion of inclusive practices in STEM classrooms. Courses she has taught include: General Microbiology, Immunology, Immunology Laboratory, Survey of Microbiology, Microbial Biology Laboratory and Freshman Microbiology Seminar. Teaching awards include the Provost’s N. Preston Davis Award for Instructional Innovation, Innovative Instructional Methodology Award in Undergraduate Education, and the Dr. Blanche M. Hughes Distinguished Faculty Staff Award.

Heidi Smith, Local Organizing Chair, is the lead faculty for microbiology at Front Range Community College in Fort Collins, CO and teaches a variety of biology courses each semester including microbiology, anatomy/physiology, cell biology lab, and biotechnology. At FRCC, Heidi also directs a federal grant program designed to increase student success in transfer and completion of STEM degrees at the local university as well as facilitate undergraduate research opportunities for underrepresented students. Heidi is an active member of the American Society for Microbiology and participated as a task force member for the development of the Curriculum Guidelines for Undergraduate Microbiology Education.
General Information

Conference Statistics
There are 350 participants, compared to 398 in 2016. Of those registered, there are:

- 308 conference attendees and 42 exhibitors
- 246 ASM Members and 62 nonmembers (among the faculty participants)
- 45% first-time attendees
- 26 international attendees representing 17 countries

Registration
Registration times and locations are listed below. Program books and badges are available at registration.

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<td>7:00 AM – 4:30 PM</td>
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<tr>
<td>South Convention Lobby</td>
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Abstracts
Abstracts for the poster sessions are featured in Volume 18, Issue 2 of the *Journal of Microbiology & Biology Education*. They may also be found in the hard copy of the *JMBE* Spotlight Issue given to attendees on-site. Late-breaking abstracts may be found in the Guidebook Mobile app.

Badges
Badges, available at registration, are required to enter all sessions and the Exhibit Hall.

Internet Connection
Complimentary wireless service is provided in the following designated areas of the hotel: lobby, meeting space, and attendee hotel rooms. Please select the network ASM and use the password asmcue2017.

Microbrew Sessions
These grassroots sessions, arranged by topics, provide a forum for sharing best practices and interesting activities used in laboratory and classroom teaching. Presentations are simple “chalk talks” (e.g., no PowerPoint) to facilitate informal discussion. Sessions will be facilitated by volunteer attendees in order to make certain each presentation stays within the 15-minute presentation (10-minute presentation and 5 minutes for discussion). Sessions must stay on time so attendees are able to move from room to room quickly to see their desired session.

**Microbrew Session I: Saturday, July 29, 11:30 AM – 12:25 PM**
Session A: 11:30 AM
Session B: 11:50 AM
Session C: 12:10 PM

**Microbrew Session II: Saturday, July 29, 2:30 PM – 3:25 PM**
Session D: 2:30 PM
Session E: 2:50 PM
Session F: 3:10 PM

**Microbrew Session III: Saturday, July 29, 3:45 PM – 4:40 PM**
Session G: 3:45 PM
Session H: 4:05 PM
Session I: 4:25 PM
Poster Sessions
Posters will be available for viewing beginning Friday, July 28 at 6:30 PM through Saturday, July 29 at 2:30 PM in Grand Ballroom II. Two time slots are set aside for authors to be at their posters. They are:

Session A: Author Presentations: Saturday, July 29, 9:15 AM – 10:15 AM
Session B: Author Presentations: Saturday, July 29, 1:30 PM – 2:30 PM

Presenters must set up and take-down/remove their posters according to the following schedule:

Set up: Friday, July 28, 3:00 PM – 6:00 PM
Take down: Saturday, July 29, 3:30 PM – 4:00 PM

Any posters left after Saturday’s take-down period will be discarded. The poster must fit into a 3’ (height) x 4’ (width) area.

ASMCUE Transportation

ASMCUE Location
All ASMCUE sessions are held at the Sheraton Denver Downtown Hotel located off of the 16th Street Pedestrian Mall in the heart of Downtown Denver.

Getting to and from Denver
There are several options for getting to the conference from the airport. Attendees can take a taxi, drive a personal vehicle, or take a shuttle from the airport. There is a fee for parking at the hotel.

Please see the Sheraton website for more information about transportation options.

Special Events and Networking

Thursday

Evening: Welcome Reception
Seek out those first-timers or experienced ASMCUE attendees and introduce yourself. Many lifelong friendships start at this conference! Thank you to sponsors at Pearson for making this gathering possible.

Friday

All Day: College and University Spirit Day
Represent your college or university! Break out your school jacket, t-shirts, ties & polos and show us your school spirit!

Breakfast: Roundtable Discussions–Topical Areas
Each year, attendees gather at this networking breakfast to meet with each other and discuss areas of interest such as active learning techniques, issues surrounding teaching and to meet leaders and participants of ASM faculty development initiatives. This year several issues have been identified by the Steering Committee including: implementing lab safety guidelines, community colleges issues, online teaching, Meet the *JMBE* Board, curriculum guidelines, and more.
**Lunchtime: Dissemination Station Resource Fair**
Interested in our new Dissemination Station Resource Fair? Visit representatives listed below from grant-funded programs and non-profit organizations as they share information about their projects and ways you can incorporate their materials and/or contribute to their efforts.

<table>
<thead>
<tr>
<th>Partnership for Undergraduate Life Sciences Education (PULSE), 501(c)(3)</th>
<th>Learn About the <em>Journal of Microbiology &amp; Biology Education</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharon Gusky, Northwestern Connecticut University</td>
<td>Kari Wester, American Society for Microbiology, 501(c)(3)</td>
</tr>
<tr>
<td><strong>Authentic Research Experience in Microbiology</strong></td>
<td><strong>CD4 Hunter: A mobile mini-game about HIV-1 binding and attachment</strong></td>
</tr>
<tr>
<td>Theodore Muth, CUNY Brooklyn College</td>
<td>Carla Brown, Drexel University College of Medicine</td>
</tr>
<tr>
<td><strong>Automated Analysis of Constructed Response (AACR) Project</strong></td>
<td><strong>Interactive Video Vignettes: Out-of-Class Priming Tools to Improve Student Learning of Biology Core Concepts</strong></td>
</tr>
<tr>
<td>Rachel Yoho, Michigan State University</td>
<td>L. Kate Wright, Rochester Institute of Technology</td>
</tr>
<tr>
<td><strong>National Science Foundation</strong></td>
<td></td>
</tr>
<tr>
<td>Laura Regassa, National Science Foundation</td>
<td></td>
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</tbody>
</table>

**Lunchtime: Job-Seeking Lounge**
Seeking a job or candidates for a position at your institution? Drop off your resume or a job announcement in the lounge Friday morning and use the lunch hour to visit and network.

**Lunchtime: Art Walk**
Micro-Art at ASMCUE: LuxArt, *Mark O. Martin, Anne Estes*
Lab Coat Makeover, *Noalani Benedict*

**Evening: Exhibit Hall Opening & Reception**
Welcome a variety of vendors who help make the conference possible through their participation and sponsorship. Learn about products and textbooks that you can incorporate into your teaching.

**Saturday**

**All Day: Identify Your Community Day**
Wear your “community” colors and represent your institution type so you can identify and network with your colleagues.

Community College = BLUE
Primarily Undergraduate Institution = GREEN
Comprehensive University = ORANGE
Doctoral-Degree Granting University = RED
International = PURPLE

**Breakfast: Roundtable Discussions—Network by Location**
ASM supports 35 branches organized by geographical territories that are defined by one or more states and/or zip code areas. On site, attendees will receive information about their branch and region and will be encouraged to meet others in the same vicinity. International attendees will have an opportunity to meet as well.

**Daytime: Poster & Microbrew Sessions**
Visit your colleagues’ poster as they describe their innovative teaching approaches or the specific activities conducted by their students. Attend a Microbrew to hear your colleagues share best practices and interesting activities used in laboratory and classroom teaching.
**Evening: Director’s Choice: HHMI Night at the Movies**

5:00 p.m. – 7:00 p.m.

We’ll screen two clips from the upcoming series that will premiere on YouTube this fall. Based on the bestselling book *I Contain Multitudes* by Ed Yong, each Episode tells the story of a microbial partnership with another lifeform and how these relationships shape the planet we live on.

The screenings will be followed by a Q&A session with featured scientist Dr. Colleen Cavanaugh, Harvard University, Dr. Mark Nielsen, HHMI, and Dr. Aileen O’Hearn, HHMI.

**Sunday**

**Closing: Anchor Plenary Session**

**Preparing Students for Today’s Workforce Needs**

*Moderator:*

Jeffrey T. Olimpo, The University of Texas at El Paso

*Panelists:*

Yoram Barak, BASF  
Susan Merkel, Cornell University  
Andreas Schirmer, REG Life Sciences  
Catherine Vrentas, Member, ASM Workforce Task Force  
Stephanie Gleason, DuPont Industrial Biosciences

The anchor session will challenge you to reflect upon the lessons learned at the conference, to put your understanding into a larger context, and to align your goals with future actions. Educational thought leaders will address overarching questions during this interactive session, and participants will discuss how these trends and ideas relate to their own campuses and experiences. In addition, participants will develop a clearer vision for the future of higher education and how that will translate to their own work.

**Travel Awardees**

Congratulations to all of the ASMCUE 2017 Travel Awardees! Formal recognition of the recipients will take place during the Thursday dinner.

**Announcing the 2017 ASMCUE Textbook Travel Award Winner!**

Dr. Vicki Isola, a professor at Hope College in Holland, MI is the 2017 ASMCUE Textbook Travel Awardee. The award is targeted at emerging leader in biology education and research and offers the recipient an opportunity to learn research and pedagogy developments, practice new technologies and techniques, and connect with other educators and researchers by attending ASMCUE. Dr. Isola’s ASMCUE Travel Award application in particular stood out to the reviewers who agreed that she should receive this year’s Textbook Travel Award.

*Funding for the Textbook Travel Award derives from a special endowment created in 2008 by several textbook authors committed to faculty development and ASMCUE. The authors sponsoring this endowment include Denise Anderson, University of Washington, Seattle; Robert Bauman at Amarillo College, Texas; Barry Chess at Pasadena City College, California; Marjorie Cowan at Miami University, Ohio; Jeffrey Pommerville at Glendale Community College, Arizona; Kathleen Talaro at Pasadena City College, California; and Christopher Woolverton at Kent State University, Ohio.*
ASMCUE Travel Awardees

The ASMCUE Travel Award recognizes leaders in biology education and research and provides them with opportunities to learn research and pedagogy developments, practice new technologies and techniques, and connect with other educators and researchers by attending ASMCUE.

- Adrian D. Allen, Howard University, Washington, DC
- Jeremy W. Chandler, University of Tennessee–Knoxville, Knoxville, TN
- Jenna M. Dolhi, Ashland University, Ashland, OH
- Revati F. Masilamani, Tufts University, Medford, MA
- Elise M. Mosser, Drexel University College of Medicine, Philadelphia, PA
- Mustafa G. Mujtaba, Florida Gulf Coast University, Fort Myers, FL
- Olabisi Ojo, Albany State University, Albany, GA
- Adeolu S. Oluremi, Ladoke Akintola University of Science & Technology, Ogbomosho, Nigeria
- Brittney Wyatt, Marquette University, Milwaukee, WI
- Kerri N. Younkin, Towson University, Towson, MD

ASMCUE Leadership Grant for International Educators

This program is sponsored by the ASM International Education Committee and has been developed to enable a select group of educators from resource-limited countries to attend the ASMCUE and a pre-conference workshop to provide international leaders in education with the resources to build innovative teaching modules that engage students and lead to enduring understandings in microbiology.

- Abere Shiferaw Alemu, Haramya University, Harar, Ethiopia
- Becky Aloo, University of Eldoret, Eldoret, Kenya
- Ritu Amatya, Nepal Medical College Teaching Hospital, Jorpati, Nepal
- Susheela Biranjia-Hurdoyal, University of Mauritius, Reduit, Mauritius
- Gina Dedeles, University of Santo Tomas, Manila, Philippines
- Hemanta Khanal, Central Campus of Technology, Dharan, Nepal
- Claudia Martinez de la Peña, Benemerita Universidad Autonoma de Puebla, Puebla, México
- Mariela Paula Mezzina, Universidad de Buenos Aires – CONICET, Facultad de Ciencias Exactas y Naturales
- Faraz Chaudry Sharif, Sheikh Zayed Medical College, Rahimyarkhan, Pakistan
- Watumesa Tan, Atma Jaya Catholic University of Indonesia, Jakarta, Indonesia
- Jayasri Das Sarma, Indian Institute of Science Education and Research – Kolkata, Mohanpur, Nadia, West Bengal, India
Exhibitors and Conference Sponsors

The American Society for Microbiology thanks the following exhibitors and sponsors for supporting ASMCUE 2017:

**Final Program Sponsor**
- www.asm.org
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- www.bluedoorpublishing.com
- www.carolina.com
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- www.licor.com/bio
- www.mheducation.com
- www.minipcr.com
- www.morton-pub.com
- OpenStax.org
- pearson.com/us
- www.minionone.com
- www.wwnorton.com
- www.simbio.com
- www.the-minion-one.com
- www.wnorton.com
- www.wiley.com
Exhibitor Showcase

Friday, July 28, 6:30 PM – 8:30 PM and Saturday, July 29, 9:00 AM – 3:30 PM
Sheraton Denver Downtown Hotel – Grand Ballroom II

Exhibitor set up is Friday 3:00 PM – 6:00 PM.
Exhibits must be dismantled by 4:00 PM on Saturday.
Read more about this year’s Exhibitors and Conference Sponsors in the Guidebook mobile app.

ASMCUE Scavenger Hunt and Raffle

The ASMCUE organizers invite you to participate in a scavenger hunt! In this game, the clues you will gather will be other attendees. Check your attendee packet for a yellow handout of instructions. This will also serve as your raffle entry. Read the instructions below carefully and you could win fabulous prizes donated by our generous sponsors!

Instructions: Find ASMCUE participant whose role is described on the handout. Place their name next to the appropriate description. Each participant’s name may appear ONLY ONCE on this sheet (yours included!). To be considered for the raffle, you must have at least 20 names.

Form submission and raffle drawing: Forms must be placed in the raffle box at ASMCUE registration table by Saturday at 12:30 PM. The raffle drawing will take place in the Exhibit Hall at 2:15 PM. Be certain to put your name and institution on the form so we can award your prize. You must be present to win!

Scavenger Raffle Prize Sponsors

The American Society for Microbiology thanks the following sponsors and exhibitors for their generosity in donating raffle prizes:

- American Society for Microbiology
- Bio-Rad Laboratories
- Biolog, Inc.
- bluedoor
- Carolina Biological Supply Company
- Jones & Bartlett Learning
- McGraw-Hill Education
- MiniOne Systems
- miniPCR
- Morton Publishing Company
Join us for a sneak peek of HHMI’s newest film project, *I Contain Multitudes*

We’ll screen two clips from the upcoming series that will premiere on YouTube this fall. Based on the bestselling book *I Contain Multitudes* by Ed Yong, each episode tells the story of a microbial partnership with another lifeform and how these relationships shape the planet we live on.

The screenings will be followed by a Q&A session with featured scientist Dr. Colleen Cavanaugh, Harvard University, Dr. Mark Nielsen, HHMI, and Dr. Aileen O’Hearn, HHMI.
## ASMCUE Program at a Glance — Thursday, July 27, 2017

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
</table>
| 10:00 AM – 3:00 PM | Pre-conference Workshop  
    Development, Implementation, and Assessment: Designing Course-Based Undergraduate Research Experiences that Effectively Maximize Learning for All Students  
    (Registered Participants Only) | Tower Court A             |
| 10:00 AM – 3:00 PM | Pre-conference Workshop  
    Flipped Case Studies in the Micro Classroom, Sponsored by HHMI  
    (Registered Participants Only) | Windows                  |
| 10:00 AM – 3:00 PM | Pre-conference Workshop  
    How to Integrate Quantitative Skills into a Microbiology Laboratory  
    (Registered Participants Only) | Tower Court B             |
| 2:00 PM – 8:00 PM    | ASMCUE Registration Desk Open  
    South Convention Lobby |                           |
| 3:45 PM – 4:00 PM    | Conference Welcome and Opening Remarks  
    Grand Ballroom I |                           |
| 4:00 PM – 5:00 PM    | Opening Plenary Lecture  
    Whole Genome Engineering: An Introduction  
    Andrew J. Hessel, Autodesk, Inc.  
    Grand Ballroom I |                           |
| 5:00 PM – 5:30 PM    | ASM, A Platform for Innovation  
    Steven Specter, Chair of ASM Membership and Innovation Board Committee |                           |
| 5:30 PM – 6:30 PM    | Dinner and Travel Award Recognition  
    Grand Ballroom II |                           |
| **Concurrent Education Sessions** | **Windows** | **Silver** | **Spruce** |
| 6:45 PM – 7:15 PM | Special Concurrent Session Mini-Workshop  
    Cultural Competency in the Classroom: Cross-Disciplinary Tools, Insights and Strategies to Promote Student Success  
    Shannon B. Seidel, Pacific Lutheran University | Finding Funds: Identifying Local Opportunities and Networking to Secure Support for Educational Activities and SOTL Research  
    Nancy M. Boury, Iowa State University  
    Special Concurrent Session Mini-Workshop  
    Interpreting Job Descriptions at Small Colleges and Making the Most of Your Application Package for a Position at a Primarily Undergraduate Institution (PUI)  
    C. Phoebe Lostroh, Colorado College | |
| 7:20 PM – 7:50 PM | Special Concurrent Session Mini-Workshop  
    Is it Even Possible? Grant Successes and Failures at a Small Undergraduate University  
    Nathan S. Reyna, Ouachita Baptist University | Supporting Sustainable Change in Science Education  
    Julie A. Reynolds, Duke University | |
| 7:55 PM – 8:25 PM | Special Concurrent Session Mini-Workshop |                           |
| 8:30 PM – 9:30 PM | Welcome Reception  
    Sponsored by Pearson  
    South Convention Lobby |                           |
The recent emergence and adoption of course-based undergraduate research experiences (CUREs) within various science, technology, engineering, and mathematics (STEM) domains has prompted careful consideration of the role of laboratory instruction in promoting student learning outcomes within laboratory contexts. While an increasing number of empirical studies and CURE frameworks have been reported, the manifold considerations that need to be taken into account when constructing authentic research opportunities can present a challenge, particularly to novice designers. In this interactive workshop, we will provide a comprehensive approach to CURE design that includes not only a discussion of evidence-based practices for the creation and assessment of CUREs, but also thoughtful attention to instructor professional development and pre-CURE coursework as integral factors in promoting students’ growth as scientific researchers. Participants will likewise have an opportunity to utilize this knowledge to begin outlining potential CURE-related experiences at their own institutions.

PRE-CONFERENCE WORKSHOP
(Registered Participants Only)
10:00 AM – 3:00 PM
Tower Court A

Development, Implementation, and Assessment: Designing Course-based Undergraduate Research Experiences that Effectively Maximize Learning for All Students

Jeffrey T. Olimpo, The University of Texas at El Paso, El Paso, TX
Christina E. D’Arcy, The University of Texas at El Paso, El Paso TX
William B. Davis, School of Molecular Biosciences, Washington State University, Pullman, WA
Sue Ellen DeChenne-Peters, University of Northern Colorado, Greeley, CO
David Esparza, University of Texas, El Paso, TX
Ginger R. Fisher, University of Northern Colorado, Greeley, CO
Thomas M. McCabe, University of Northern Colorado, Greeley, CO

PRE-CONFERENCE WORKSHOP
(Registered Participants Only)
10:00 AM – 3:00 PM
Windows

Flipped Case Studies in the Micro Classroom, Sponsored by HHMI

Annie Prud’homme-Genereux, Quest University Canada, British Columbia
Melissa Csikari, Howard Hughes Medical Institute, Bethesda, MD

Are you looking for a way to make your classroom an engaging and collaborative space where students practice the skills of thinking-like-a-scientist while working on real-world problems? Are you torn between doing the above and covering content? In this session, we will explore one pedagogical method of doing both: flipped case studies. In the first part of the session, you will experience the case discussion method as learners. We will dissect how a story can be used to drive the learning effectively in the classroom. In the second part of the session, we will explore how resources, such as HHMI BioInteractive, can be integrated into this process to provide just-in-time engaging learning. By the end of the session, each participant will have developed a lesson plan for one class on the flipped model. Come prepared to do the intellectual heavy-lifting, and we’ll tell you a story…

PRE-CONFERENCE WORKSHOP
(Registered Participants Only)
10:00 AM – 3:00 PM
Tower Court B

How to Integrate Quantitative Skills into a Microbiology Laboratory

Brian M. Forster, Saint Joseph’s University, Philadelphia, PA
Holly A. Basta, Rocky Mountain College, Billings, MT

In fall 2016, ASM teamed up with QUBES (Quantitative Undergraduate Biology Education and Synthesis) to offer a 4-part webinar series on how to increase quantitative biology in the classroom. In this session, we will review the material presented in this M(icro)OOC and allow participants to put the theory to practice! When microbiology students come to lab, we expect them to be competent in basic math skills. Even though these are concepts discussed in high school and introductory biology, we are seeing more and more of our students lacking in this knowledge. In this session we will discuss how we can connect math to the biology we teach, how to create throwback
Thursday (#tbt) moments in class to get students to master math in the lab without losing the microbiology concepts we want to cover and how to extract useful information from their data. Participants will then work in teams to revise their own lab activity or lesson to incorporate the ideas discussed.

ASMCUE REGISTRATION
2:00 PM – 8:00 PM
South Convention Lobby

WELCOME AND OPENING REMARKS
3:45 PM – 4:00 PM
Grand Ballroom I

OPENING PLENARY LECTURE
4:00 PM – 5:00 PM
Grand Ballroom I

Whole Genome Engineering: An Introduction
Andrew J. Hessel, Autodesk Inc., San Francisco, CA
We have entered a golden age of microbiology made possible by advances in digital information technologies and genetic technologies. With DNA sequencing and biological databases, it is now possible to molecularly dissect the metabolism of bacteria and viruses and to computationally create accurate simulations of their physical form and biochemical machinery. In addition, biological CAD software and whole genome DNA synthesis technologies now permit scientists and engineers to imagine, design, and create synthetic viruses and single-celled organisms from scratch. This opens a path to the rapid engineering of new vaccines, antibiotics, materials, therapeutics, and more. This talk will introduce these technologies, provide concrete examples of their use, and discuss various timelines, trends, and implications.

ASM, A PLATFORM FOR INNOVATION
5:00 PM – 5:30 PM
Grand Ballroom I
Steven Specter, Chair of ASM Membership and Innovation Board Committee

DINNER AND TRAVEL AWARD RECOGNITION
5:30 PM – 6:30 PM
Grand Ballroom II

CONCURRENT EDUCATION SESSIONS

SPECIAL CONCURRENT SESSION
MINI-WORKSHOP
6:45 PM – 8:25 PM
Windows
Cultural Competency in the Classroom: Cross-Disciplinary Tools, Insights and Strategies to Promote Student Success
Shannon B. Seidel, Pacific Lutheran University, Tacoma, WA
In this interactive workshop, participants will share a common experience as the basis for discussing how students may experience classroom environments differently from one another. Individual participants will then have the opportunity to self-assess their current awareness of 20 common equitable teaching strategies and identify those that could be immediately implemented in their classrooms.

SPECIAL CONCURRENT SESSION
MINI-WORKSHOP
6:45 PM – 8:25 PM
Windows
Interpreting Position Descriptions (job ads) and Making the Most of Your Application Package to Work at a Primarily Undergraduate Institution (PUI)
C. Phoebe Lostroh, Colorado College, Colorado Springs, CO
About 90% of applicants for tenure-track and visiting positions at small colleges make common mistakes in their written materials and thus never get to the interview stage. This workshop will show you how to increase the chance that the search committee will discuss your application in detail before they decide which candidates to interview. This workshop is intended to help post-doctoral research fellows and graduate students learn more about small colleges with a focus on developing the best possible application package in response to a call for applications. Participants will learn strategies to determine the

24th Annual ASM Conference for Undergraduate Educators, Denver, Colorado 21
relative balance of research and teaching at different institutions, to write cover letters, and to prepare other materials for a typical application package. We will go online to examine real ads and discuss them, so bring a device you can use to access the internet. We will also talk about optimizing your preparation for the range of positions available at PUIs; for example, some positions require post-doctoral research while others do not.

6:45 PM – 7:15 PM
Silver

Finding Funds: Identifying Local Opportunities and Networking to Secure Support for Educational Activities and SoTL Research

Nancy M. Boury, Iowa State University, Ames, IA
Samantha T. Parks, Georgia State University, Atlanta, Georgia

Is your course ready for re-vamping, but you lack time or assistance? Do you want to engage in educational research but lack time, equipment or funds to support conference attendance? If only you could hire undergraduates, buy technology or airfare… In this session we will discuss how to seek funding for such projects, prioritize key budget items, and identify key components of successful education grants. We will also describe various outlets to disseminate your funded work, and methods to leverage data and experience from smaller projects. This session will be interactive, with speakers and participants sharing experiences, best practices and networking.

7:20 PM – 7:50 PM
Silver

Is It Even Possible? Grant Successes and Failures at a Small Undergraduate University

Nathan S. Reyna, Ouachita Baptist University, Arkadelphia, AR
Lori Hensley, Ouachita Baptist University, Arkadelphia, AR
Ruth Plymale, Ouachita Baptist University, Arkadelphia, AR

Yes, it is possible, but one must be strategic in choosing how to apply for funding. Ouachita Baptist University is a small, residential, undergraduate university in southwestern Arkansas with a student body of 1,500. While research and publications are not a requirement for tenure, student involvement in research is. Both internal (alumni, institutional) and external (HHMI, NIH-INBRE, NASA, GCAT, NSF-EPSCoR) funding sources have been vital to the expansion of research experiences for our undergraduates. An often-overlooked source of funding is through faculty development workshops such as GCAT, AR-CURE project, and HHMI-SEAPHAGES. Often these programs will provide funding for travel, training, and supplies. More importantly, these workshops provide the research diversity and foundation needed for larger grants in the future. Over the last nine years, we have had epic failures and a medium level of success. One key to successes at a small undergraduate university is the incorporation of undergraduate education into the grant. By having diverse research interests and treating the classroom as an extension of the research lab, we can set ourselves apart from the herd.

7:55 PM – 8:25 PM
Silver

Supporting Sustainable Change in Science Education

Julie A. Reynolds, Duke University

Sustainable change in science education takes more than just good ideas; it takes time, energy, money, and personnel. In the past seven years, my research group has secured ~$7 million from NSF (TUES and IUSE), NIH (IMSD), and HHMI to support large-scale initiatives designed to tackle some of the most challenging barriers to sustainable education reform faced by teaching faculty in research universities. In this talk, I’ll describe five steps I found essential for moving from ideas to implementation: precisely identifying the issue(s) to be addressed, building a skilled team, leveraging existing resources, writing a persuasive argument, and targeting funding opportunities accurately. I’ll also demonstrate how logic models can be powerful tools for designing and communicating about complex educational problems.

WELCOME RECEPTION
8:30 PM – 9:30 PM
Grand Ballroom I
Sponsored by Pearson
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>7:00 AM – 8:00 PM</td>
<td>ASMCUE Registration Desk Open</td>
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<td>South Convention Lobby</td>
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<tr>
<td>7:00 AM – 7:45 AM</td>
<td>Networking Breakfast by Topical Areas</td>
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<td>South Convention Lobby</td>
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<td>7:45 AM – 8:15 AM</td>
<td>Concurrent Education Sessions</td>
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<td>Windows</td>
<td>Silver</td>
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<td>Tower Court A</td>
<td>Tower Court D</td>
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<tr>
<td>7:45 AM – 8:15 AM</td>
<td>Incorporating the ASM Concept Inventories into your Course Design</td>
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<td></td>
<td>Heather M. Seitz, Johnson County Community College</td>
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<tr>
<td>8:20 AM – 8:50 AM</td>
<td>Evidence-Based Methods to Improve Student Learning in the Life Sciences</td>
</tr>
<tr>
<td></td>
<td>Jenny K. Knight, University of Colorado, Boulder</td>
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<td></td>
<td>Ally Hunter, University of Massachusetts, Amherst</td>
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<tr>
<td>9:35 AM – 10:05 AM</td>
<td>Designing and Implementing a Project-Based Biology Course</td>
</tr>
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<td>Melissa Zwick, Stockton University</td>
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<td>10:10 AM – 10:40 AM</td>
<td>Flipping a Microbiology Lecture Course: Lessons Learned</td>
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<td>Jennifer L. Koehl, Saint Vincent College</td>
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<tr>
<td>11:00 AM – 11:30 AM</td>
<td>Mentoring the Mentors: The Impacts of a Mentoring Web on STEM Student Success</td>
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<td></td>
<td>Ally Hunter, University of Massachusetts, Amherst</td>
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<tr>
<td>11:35 AM – 12:05 PM</td>
<td>Challenges Facing Microbiology in the Nursing Curriculum</td>
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<td>Bethany L. Adamec, American Society for Microbiology</td>
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<tr>
<td>12:10 PM – 12:40 PM</td>
<td>Interactive Video Vignettes: Out-of-class Priming Tools to Improve Student Learning of Biology Core Concepts</td>
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<td>L. Kate Wright, Rochester Institute of Technology</td>
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<tr>
<td>12:45 PM – 1:15 PM</td>
<td>Characterization of Undergraduate Teaching and Learning Assistant Instructional Practices in the Context of an Introductory Cell and Molecular Biology Course</td>
</tr>
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<td>Jeffrey T. Olimpo, The University of Texas at El Paso</td>
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<tr>
<td>1:20 PM – 1:50 PM</td>
<td>Preliminary ASM Guidelines and Toolkit Supporting Microbiology in the Nursing Curriculum</td>
</tr>
<tr>
<td></td>
<td>Brian M. Forster, Saint Joseph’s University</td>
</tr>
<tr>
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<td>Carol A. Bascom-Slack, Tufts University</td>
</tr>
<tr>
<td>2:30 PM – 3:00 PM</td>
<td>Professional Development Isn’t Just for Teachers: Preparing Your Undergraduate Teaching Assistants Too!</td>
</tr>
<tr>
<td></td>
<td>Patricia A. Shields, University of Maryland, College Park</td>
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<tr>
<td>3:05 PM – 3:35 PM</td>
<td>Discussion: Supporting Microbiology in the Nursing Curriculum</td>
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<td></td>
<td>Bethany L. Adamec, American Society for Microbiology</td>
</tr>
<tr>
<td>3:40 PM – 4:10 PM</td>
<td>Team-Based Learning in Undergraduate Biology Education</td>
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<td>Rebecca B. Orr, Collin College</td>
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<td>Kerri N. Younkin, Towson University</td>
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<td>Dave J. Westenberg, Missouri University of Science and Technology/ HHMI</td>
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<td>5:25 PM – 5:55 PM</td>
<td>Student-Centered Approaches to Scientific and Quantitative Writing</td>
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<td>Tracy Ruscetti, Santa Clara University</td>
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<td>Mark A. Randa, Cumberland County College</td>
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<td>6:35 PM – 7:05 PM</td>
<td>Using Quantitative Literacy to Prepare Students for 21st Century Careers in Biology</td>
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<td>Jodie Krontiris-Litowitz, Youngstown State University</td>
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<td>Concurrent Education Sessions (continued)</td>
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<tr>
<td><strong>10:45 AM – 11:15 AM</strong></td>
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<tr>
<td>Using Scientific Teaching Methods to Improve Learning and Your Own Life</td>
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<tr>
<td>Kelly M. Cowan, Miami University, Middletown, OH</td>
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<tr>
<td>Design and Implementation of a Synthetic Biology CURE</td>
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<td>Nathan S. Reina, Ouachita Baptist University</td>
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<tr>
<td>Virus Hunters: Fostering Critical Thinking through Quantification and Data Interpretation</td>
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<td>Holly A. Basta, Rocky Mountain College</td>
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<tr>
<td>Implementation of an Interactive Statistics Workshop within the Context of an Introductory Biology Course-Based Undergraduate Research Experience: Impacts on Novices' Quantitative Reasoning and Literacy Skills</td>
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<td>Ryan S. Pevey, University of Northern Colorado</td>
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<tr>
<th>Concurrent Scientific Sessions</th>
<th>Windows</th>
<th>Silver</th>
<th>Grand Ballroom I</th>
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<tbody>
<tr>
<td><strong>11:30 AM – 12:00 AM</strong></td>
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<tr>
<td>Investigating the Enigma of Arbovirus Infections: Diseased Vertebrates, Healthy Mosquitoes</td>
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<td>Carol D. Blair, Colorado State University</td>
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<td>Regulation of Transcription to Oxidative Stress by the Conserved DksA Protein of Gram-Negative Bacteria</td>
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<td>Andrés Vázquez-Torres, University of Colorado School of Medicine</td>
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<td>The Microbial Ecology of Our Homes</td>
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<td>Noah Fierer, University of Colorado, Boulder</td>
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<td><strong>12:30 PM – 2:00 PM</strong></td>
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<td>Lunch</td>
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<td>South Convention Lobby</td>
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<td>Dissemination Station Resource Fair</td>
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<td>North Convention Lobby</td>
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<td>Art Walk</td>
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<td>Tower Court B</td>
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<tr>
<td>Job-Seeking Lounge</td>
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<td>JMBE Office Hours (By Appointment Only – Sign-up at Registration Desk)</td>
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<td>Tower Court C</td>
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<tr>
<td>REIL-Biology Poster Session</td>
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<tr>
<td>Grand Ballroom Foyer</td>
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<tr>
<td>PARE Group Meeting (For Current and Past PARE Instructors)</td>
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<td>Tower Court D</td>
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<tr>
<td><strong>2:00 PM – 3:00 PM</strong></td>
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<tr>
<td>Metabolic Engineering of Microbes for Production of Green Fuels and Chemicals</td>
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<td>Calvin A. Henard, National Renewable Energy Laboratory (NREL)</td>
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<td>Chronic Wasting Disease... On the Move</td>
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<td>Candace K. Mathiason, Colorado State University</td>
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<td>Zika Virus: Insights into Gathering Evidence for Causation in Science</td>
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<td>Brian D. Foy, Colorado State University</td>
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<td><strong>3:00 PM – 6:00 PM</strong></td>
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<td>Exhibitor and Poster Setup</td>
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<td>Grand Ballroom II</td>
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## Concurrent Education Sessions

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location/Room</th>
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<tbody>
<tr>
<td>3:15 PM – 3:45 PM</td>
<td><strong>Helping Students Succeed: FYE Across the STEM Curriculum</strong>&lt;br&gt;  Jaclyn A. Madden, Harford Community College</td>
<td>Windows Silver Tower Court A Tower Court D</td>
</tr>
<tr>
<td>3:15 PM – 3:45 PM</td>
<td><strong>Workforce: Microbiology at NREL</strong>&lt;br&gt;  Sandra F. Notonier, National Renewable Energy Laboratory (NREL)</td>
<td>Windows Silver Tower Court A Tower Court D</td>
</tr>
<tr>
<td>3:15 PM – 3:45 PM</td>
<td><strong>Student Learning: A Global Perspective Panel, 2017 ASMCUE Leadership Grant Program for International Educators</strong>&lt;br&gt;  The PULSE Program: An Overview&lt;br&gt;  Heather M. Seitz, Johnson County Community College</td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<tr>
<td>3:50 PM – 4:20 PM</td>
<td><strong>Navigating the Challenges of Effective Teaching and Learning at Today’s Community Colleges</strong>&lt;br&gt;  Jennifer A. Herzog, Herkimer County Community College</td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<tr>
<td>3:50 PM – 4:20 PM</td>
<td><strong>Workforce: Microbiology in a Brewery</strong>&lt;br&gt;  Kelly Tretter, New Belgium Brewing Company</td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<tr>
<td>3:50 PM – 4:20 PM</td>
<td><strong>Student Learning: Diversity and Inclusion</strong>&lt;br&gt;  Ria Vigil, Colorado State University</td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<td>3:50 PM – 4:20 PM</td>
<td><strong>Catalyzing Change Within Your Department Using the PULSE Ambassador Program</strong>&lt;br&gt;  Karen K. Klyczek, University of Wisconsin, River Falls</td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<tr>
<td>4:25 PM – 4:55 PM</td>
<td><strong>Considering Students’ Spatial Reasoning When Deciding the Types of Models (2D vs. 3D) to Teach Molecular-Level Processes</strong>&lt;br&gt;  Lacy M. Cleveland, University of Northern Colorado</td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<td>4:25 PM – 4:55 PM</td>
<td><strong>Workforce: Microbiology in the Food Science Industry</strong>&lt;br&gt;  Larry Steenson, Leprino Foods</td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<td>4:25 PM – 4:55 PM</td>
<td><strong>Student Learning: Diverse Students in Diverse Settings: Increasing Discipline-Based Education Research in Community Colleges</strong>&lt;br&gt;  Heather M. Seitz, Johnson County Community College</td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<td>4:25 PM – 4:55 PM</td>
<td><strong>Using the PULSE Snapshot Rubrics to Assess Alignment with the Vision and Change Recommendations</strong>&lt;br&gt;  Sharon B. Gusky, Northwestern Connecticut Community College</td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<tr>
<td>5:15 PM – 6:15 PM</td>
<td><strong>Plenary Lecture</strong>&lt;br&gt;  <strong>Institutional Transformation: Models and Strategies of Institutional Change in Practices for Undergraduate Teaching and Research</strong>&lt;br&gt;  Sylvia Hurtado, UCLA Graduate School of Education &amp; Information Studies, Los Angeles, CA</td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<td>5:15 PM – 6:15 PM</td>
<td><strong>Grand Ballroom I</strong></td>
<td>Windows Silver Tower Court A Tower Court D</td>
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<tr>
<td>6:30 PM – 8:30 PM</td>
<td><strong>Exhibit Opening &amp; Reception</strong></td>
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COLLEGE AND UNIVERSITY SPIRIT DAY
Represent your college or university! Break out your school jacket, t-shirts, ties & polos and show us your school spirit!

ASMCUE REGISTRATION
7:00 AM – 8:00 PM
South Convention Lobby

BREAKFAST BY TOPICAL AREAS
7:00 AM – 7:45 AM
South Convention Lobby

ASM facilitates the e-mail based discussion group, MICROEDU. Here, microbiology educators can learn from each other by exchanging ideas and communicating issues and challenges. Many informative and thoughtful conversations take place within this listserve community and we encourage attendees to revisit the issues face-to-face. Several topics have been identified by the Steering Committee and a complete list will be available on-site and in the conference scheduling app.

CONCURRENT EDUCATION SESSIONS

7:45 AM – 8:15 AM
Windows
Incorporating the ASM Concept Inventories into Your Course Design

Heather M. Seitz, Johnson County Community College, Overland Park, KS

In this session participants will learn about the Microbiology Concept Inventory as well as the Microbiology for Health Sciences Concept Inventory. The background and development process for the concept inventories will be shared. The participants will also learn about ways to incorporate the concept inventories into their course design, how to generate valuable assessment data, and form community with faculty around development of innovative teaching strategies. Examples of assessment data and teaching innovations will be shared. The presentation will focus on key concepts from the ASM Curriculum guidelines and common misconceptions that students possess.

7:45 AM – 8:15 AM
Silver
Mentoring the Mentors: The Impacts of a Mentoring Web on STEM Student Success

Ally Hunter, University of Massachusetts, Amherst, MA
Carolyn Gardner-Thomas, University of Massachusetts, Amherst, MA

Decades of STEM retention research has demonstrated that good mentoring and early research experiences are key factors in the persistence of undergraduates in their STEM majors. At STEM Ambassadors, we engage entering STEM majors by charging them with their own mentoring experiences (elementary and middle school students) while at the same time ushering them through research experiences mentored by first graduate students and then eventually faculty. Two particular facets of the programming will be presented and discussed: how we build inclusive practices into our programming for our undergraduates and how we use the “Entering Mentoring” training for the graduate students in our program. This workshop will be informed by the findings on STEM student success from our program. The Social Cognitive Career Theory (SCCT) was used as a framework for the assessment of student outcomes in this longitudinal study whereas success is defined as building STEM self-efficacy, STEM outcome expectations, STEM interest, and sense of belonging.

7:45 AM – 8:15 AM
Tower Court A
Challenges Facing Microbiology in the Nursing Curriculum

Bethany Adamec, American Society for Microbiology, Washington, DC
Archana Lal, Independence Community College, Independence, KS
Lourdes P. Norman, Florida State College at Jacksonville, Jacksonville, FL
Elizabeth Vaughn, Galen College of Nursing, Louisville, KY

Microbiology is an important component of the nursing curriculum, yet microbiology in many nursing degree programs faces challenges including reduced numbers of credits in programs overall, elimination of microbiology courses and laboratory sections, integration of microbiology into other courses, and more. These challenges are particularly apparent in two-year RN degree programs. To address these issues, the American Society for
Microbiology (ASM) formed a Microbiology in Nursing Task Committee. During a panel discussion, ASM will provide a brief overview of the work of the Committee and Committee members will highlight the causes of these challenges.

7:45 AM – 8:15 AM
Tower Court D

Interactive Video Vignettes: Out-of class Priming Tools to Improve Student Learning of Biology Core Concepts

L. Kate Wright, Rochester Institute of Technology, Rochester, NY
Dina L. Newman, Rochester Institute of Technology, Rochester, NY
Jean A. Cardinale, Alfred University, Alfred, NY

Session participants will be introduced to Interactive Video Vignettes (IVVs), a new genre of web-based tools that are used to prime students for deep learning of important, and often-times difficult, biological concepts. IVVs are short, live-action videos that employ research-based strategies to keep the user engaged and to encourage prediction and reflection. During this interactive session, workshop participants will work in small groups to discuss areas of student difficulty, identify how the IVVs address their needs, observe IVV assessment data, and plan the next steps needed for them to incorporate IVVs into their own course. The goal of our proposed session is to empower biology educators to take advantage of this effective, free, and minimal-effort requiring resource to improve student learning in their own courses.

8:20 AM – 8:50 AM
Windows

Evidence-Based Methods to Improve Student Learning in the Life Sciences

Jenny K. Knight, University of Colorado, Boulder, CO

How well do students transfer in-class, active learning group practices to individual challenging assessment opportunities? What kinds of assessments can we use to measure both conceptual understanding and science skills? We are using many years of student interview data as well as more recent explanations of how students solve problems to gain insight into student thinking. Analyses of these data may help us sort through what types of questions provide truly meaningful data about student learning.

8:20 AM – 8:50 AM
Silver

Characterization of Undergraduate Teaching and Learning Assistant Instructional Practices in the Context of an Introductory Cell and Molecular Biology Course

Jeffrey T. Olimpo, The University of Texas at El Paso, El Paso, TX
Thomas M. McCabe, University of Northern Colorado, Greeley, CO
Patricia A. Shields, University of Maryland, College Park, MD

Within the last decade, the utilization of undergraduate teaching assistants (UTAs) in science, technology, engineering, and mathematics (STEM) learning environments has grown exponentially. Research suggests that this marked increase is resultant not only from substantive evidence regarding the benefits UTAs provide for student success, but also the challenges associated with burgeoning enrollment and limited institutional resources. Despite this being the case, little remains known about the degree to which UTAs employ student- vs. teacher-centered practices in the classroom and how these patterns of instruction evolve over time. During this interactive session, we will engage participants in discussion regarding how to address these concerns, as well as present data from an ongoing research initiative being conducted at our institutions that utilizes classroom observation data as a metric to objectively evaluate student and instructor behaviors in UTA-supported introductory biology coursework.

8:20 AM – 8:50 AM
Tower Court A

Preliminary ASM Guidelines and Toolkit Supporting Microbiology in the Nursing Curriculum

Brian M. Forster, Saint Joseph’s University, Philadelphia, PA
Andrea Rediske, University of Central Florida, Orlando, FL

To support instructors, the ASM Microbiology in Nursing Task Committee has drafted a community-driven set of guidelines for microbiology in the two-year RN curriculum. Committee members will present the draft Guidelines and an accompanying Toolkit supporting microbiology in the nursing curriculum. Community feedback will be solicited.
8:20 AM – 8:50 AM
Tower Court D

Prevalence of Antibiotic-Resistance in the Environment (PARE): A Bite-Sized, Flexible Gateway into Classroom-Based Research

Carol Bascom-Slack, Tufts University, Boston, MA

Course-based research experiences (CREs) are a successful way to increase student exposure to research, yet the majority of laboratory courses still engage students in traditional “cookbook” courses. Developing CREs can be time consuming, expensive and may be challenging at institutions without major research infrastructure. This session will present the Prevalence of Antibiotic Resistance in the Environment (PARE) project, a short-duration research module with opportunities for incremental expansion. Students survey local, GPS-tagged soil samples for the prevalence of tetracycline-resistant microbes and report their findings to a nationwide database. The program has been implemented at nearly 50 institutions ranging from 2-year colleges to doctorate-granting institutions and in over 25 high schools. Students report gains in attitude and personal growth with students historically underrepresented in STEM and those at non-doctoral granting institutions both showing higher average gains than their counterparts. The PARE program provides a network for collaboration and communication among instructors with the goal of facilitating flexible expansion of the classroom research experience and providing opportunities for instructor professional advancement. We invite attendees to share their own classroom research projects or ideas that align with PARE goals and to help us gauge items of value for professional advancement at their particular institutions.

8:55 AM – 9:25 AM
Silver

Professional Development Isn’t Just for Teachers: Preparing Your Undergraduate Teaching Assistants Too!

Patricia A. Shields, University of Maryland, College Park, MD

As education resources at university and state levels become increasingly scarce, more of us find ourselves using Undergraduates in the classroom as teaching and learning assistants (UTA/ULA). Unfortunately, programs to adequately prepare these valuable partners in education tend to be missing or limited to content in biology. It is critical that we provide “professional development” to the youngest of the education community! Join us for an interactive session as we discuss how to set up your own professional development program that helps to prepare your UTAs and ULAs not only for content, but for what it means to be engaged in education. We will discuss options that will help you determine if a simple approach or a more extensive program is the best option for you. Finally, we will provide examples of how we have set up both small and larger programs for professional development of UTAs and ULAs at the University of Maryland.

8:55 AM – 9:25 AM
Tower Court A

Discussion: Supporting Microbiology in the Nursing Curriculum

Bethany L. Adamec, American Society for Microbiology, Education Department, Washington, DC
Archana Lal, Independence Community College, Independence, KS
Lourdes P. Norman, Florida State College Jacksonville, FL
Elizabeth Vaughn, Galen College of Nursing, Louisville, KY

Reflecting on the challenges facing microbiology in the nursing curriculum, members of the ASM
Microbiology in Nursing Task Committee and ASM staff will facilitate a community discussion of these issues and potential solutions. The draft ASM Guidelines for Microbiology in the Two-Year RN Curriculum will be reviewed briefly, and feedback will be solicited on both the Guidelines and an accompanying Toolkit supporting microbiology in the nursing curriculum.

8:55 AM – 9:25 AM
Tower Court D

Team-Based Learning in Undergraduate Biology Education

Rebecca B. Orr, Collin College, Plano, TX
Donna M. Cain, Collin College, Plano, TX
Bridgette L. Kirkpatrick, Collin College, Plano TX

Undergraduate biology students are incredibly diverse in backgrounds and experiences, making it challenging to teach content as well as critical thinking skills. Dr. Robert Bjork’s research asserts that retrieval of stored information acts as a memory modifier (Bjork, 2011), and active learning has consistently been demonstrated to be a more effective teaching practice than traditional lecturing (Freeman, 2014). This interactive session introduces team-based learning (TBL) as a successful flipped classroom approach in undergraduate biology courses. TBL fosters higher-level thinking skills, promotes active learning, encourages team/group dynamics, and makes students accountable for their own learning. Attendees will experience TBL from the student perspective. Specific examples of active learning activities for microbiology and general biology will be provided.

CONCURRENT EDUCATION SESSIONS

9:35 AM – 10:05 AM
Windows

Designing and Implementing a Project-Based Biology Course

Melissa Zwick, Stockton University, Galloway, NJ

Multiple reform efforts have highlighted the need for student-centered classrooms in undergraduate biology education. Project-based learning is both an active and collaborative approach that achieves this objective. Carefully designed projects teach course content, emphasize critical thinking, and science process skills to achieve learning outcomes. This session will introduce participants to the essential elements of a project-based learning environment and will also cover the broader framework that needs to be created to effectively implement this approach into an undergraduate biology course. Participants will have the opportunity to brainstorm potential project ideas and begin designing a project-based course. I will share examples and assessment data from an upper-level biology course to illustrate how to implement a project-based design and measure learning outcomes.

9:35 AM – 10:05 AM
Silver

Scaffolding the Levels of Inquiry-Based Learning throughout a Biology Lab Course

Kerri N. Younkin, Towson University, Baltimore, MD

Trying to engage today’s students? Inquiry-based instruction (IBI) parallels and meets today’s students’ demand for authentic, real world experiences in the classroom. To move away from traditional lab protocols where students are given step by step procedures and expected results, IBI focuses on exploration before explanation and allows for a student-centered approach in the classroom. Educators define four levels of inquiry; the highest level mimics the work scientists do. A hallmark of IBI is that professors develop different scaffolds within the four levels of inquiry to provide support as students learn to design and implement investigations to answer specific questions.

Participants in this session will examine four versions of the same lab to identify levels of inquiry and examples of scaffolds. We will review data from undergraduate biology classes taught with different levels of IBI. We will then discuss ways to overcome challenges of implementing IBI.

9:35 AM – 10:05 AM
Tower Court A

Pairing Multimedia with Primary Literature for Active Learning

Dave J. Westenberg, Missouri University of Science and Technology/HHMI, Rolla, MO

Over the last few decades several species of bumble bees have been declining in the US. A group at the University of Wisconsin-Madison led by Dr. Shawn Steffan discovered that the food source for bumble bee larvae is rich in yeast. Based on this observation,
he proposed that the use of fungicides could affect the health of bumble bee colonies. This session will highlight HHMI’s “Scientist at Work” video of Steffan’s experiment to test this hypothesis by comparing the sizes of bumble bee colonies that forage on flowering plants grown in the presence or absence of fungicides. Coupling the media with relevant primary literature encourages critical thinking, quantitative reasoning, interdisciplinary nature of science and understanding of the relationship between science and society. This activity will encourage students to make observations, read and analyze primary literature and recognize the importance of potential unforeseen consequences of fungicide use.

9:35 AM – 10:05 AM
Tower Court D

Student-Centered Approaches to Scientific and Quantitative Writing

Tracy Ruscetti, Santa Clara University, Santa Clara, CA
Katie Krueger, Santa Clara University, Santa Clara, CA
Christelle Sabatier, Santa Clara University, Santa Clara, CA

In our introductory, laboratory-intensive biology course, we expect students to use writing to demonstrate their understanding of complex concepts, communicate their analysis of quantitative data, and convey their critical thinking and reasoning. However, we found it difficult to assess these high-level cognitive skills when student writing is poor. We developed strategies to explicitly support writing about data, specifically, quantitative comparisons such as, ‘the activity of X is 3 fold faster than Y’. We defined the crucial elements required to make a clear quantitative comparative statement and developed an easy annotation scheme to help students self-regulate their writing. Our strategy, 4C annotation, helps students write the clear, comparative statements that form the basis for the results section in their lab reports. Participants will learn how to easily dissect quantitative writing and provide quantitative writing support for their students. Our data show that helping students improve their quantitative writing allows them to focus on the reasoning required to analyze their data.

10:10 AM – 10:40 AM
Silver

An Undergraduate Teaching Lab Focused on CRISPR

Christopher J. Phiel, University of Colorado, Denver, CO
Kelsie J. Faulds, University of Colorado, Denver, CO

Recently, researchers have identified a novel mechanism that can be used to manipulate and edit DNA in any organism, including humans. This technology, called CRISPR, is revolutionizing biology on many fronts, from the study and potential treatment of genetic disorders, to use in preventing the transmission of disease by mosquitos and other organisms, to the creation of crops resistant to disease. Leveraging the excitement CRISPR has generated among students, I redesigned my molecular biology lab course to focus on performing gene editing in mammalian cells using CRISPR. My presentation will outline my efforts to bring this technology to undergraduates.

10:10 AM – 10:40 AM
Tower Court A

Natural Selection in the Ebola Outbreak: Integrating Multimedia and Primary Literature into Undergraduate Biology Education

Mark A. Randa, Cumberland County College, Vineland, NJ

In this workshop, participants will see how to scaffold learning by pairing multimedia, a hands-on classroom activity and primary literature to improve student understanding and engagement. In HHMI’s, “Think Like a Scientist: Natural Selection in an Outbreak,” computational geneticist Pardis Sabeti and disease ecologist Lina Moses bring us to the front line of the...
Ebola epidemic and explain the science behind how this event became the largest Ebola outbreak in history. The short film reveals the invisible world of viruses and portrays some of the most dramatic moments of the recent Ebola crisis. Participants in the workshop will watch a segment of the film and then actively work through a classroom activity in small groups where they will analyze and interpret DNA sequence data and follow the Ebola virus transmission in a small set of patients in Sierra Leone. The session will conclude with a primary literature tie-in using resources from Science in the Classroom.

10:10 AM – 10:40 AM
Tower Court D

Using Quantitative Literacy to Prepare Students for 21st Century Careers in Biology
Jodie Krontiris-Litowitz, Youngstown State University, Youngstown, OH
Alicia Prieto-Langarica, Youngstown State University, Youngstown, OH

Modern biology is information driven science characterized by data collection, data interpretation and data analysis. These data-oriented needs require problem solving skills and behavioral skills that are based in the real-world application of mathematical and reasoning abilities embodied in quantitative literacy (QL). Future biologists must be able to solve quantitative problems in authentic work situations, use data to create and support sophisticated arguments, and communicate quantitatively based arguments. These skills are not the learning outcomes of traditional college math courses but rather habits of the mind that can be better taught in contextual situations found in biology courses and labs. In this session I will present 1) a set of learning objectives (LO) for QL that can be embedded in a course or lab, 2) curricular activities that promote the LO in lab or lecture and 3) sample assessments and strategies for developing evaluation tools.

10:45 AM – 11:15 AM
Silver

Design and Implementation of a Synthetic Biology CURE
Nathan S. Reyna, Ouachita Baptist University, Arkadelphia, AR

Ouachita Baptist University is an small undergraduate university in southwestern Arkansas. We have begun the replacement of traditional science labs with course-based research experiences (CURE) at all levels of the Biology curriculum. However, developing a CURE de novo can be a challenging experience. Through the development of CUREs for Cell Biology, Genetics, and Microbiology, we have identified six key components as being crucial to the success of a CURE: 1) a sense of ownership, 2) a challenging project, 3) consistent project goals, 4) a manageable number of techniques for students to master, 5) participation in the larger scientific community and 6) affordability. One of our most successful de novo CUREs is the synthetic biology lab. With improvements in DNA synthesis and assembly technique, undergraduates can design and test new DNA parts, devices, and systems with widespread applications. We will present how we used this lab at OBU and the key components needed to complete the project. Through the Arkansas-CURE project, which focuses on classroom implementation and student-oriented outcomes, we have created a workshop that will help faculty start similar projects on their campuses.
10:45 AM – 11:15 AM
Tower Court A

Virus Hunters: Fostering Critical Thinking through Quantification and Data Interpretation

Holly A. Basta, Rocky Mountain College, Billings, MT

Let’s transform lecture into a student-centered environment where students can explore the richness of real scientific data. We will model how to do this using a classroom activity that supports a film from HHMI’s Scientist at Work series. Students watch “Virus Hunters: Monitoring Nipah Virus in Bat Populations,” featuring epidemiologist Dr. Jon Epstein, then complete an activity, exploring data from an outbreak of Nipah virus in Malaysia. Students are introduced to terminology and simple epidemiological calculations and then use provided data to predict the evolutionary history of the virus. After making a prediction, students interpret a published phylogenetic tree to support or refute their prediction. This activity highlights the interdisciplinary nature of science including virology, evolution, biotechnology and phylogeny and includes critical thinking, mathematics, data interpretation, and claim-evidence-reasoning. The activity could be adapted to many undergraduate courses and is a great way to assess a number of learning outcomes quickly.

10:45 AM – 11:15 AM
Tower Court D

Implementation of an Interactive Statistics Workshop within the Context of an Introductory Biology Course-Based Undergraduate Research Experience: Impacts on Novices’ Quantitative Reasoning and Literacy Skills

Ryan S. Pevey, University of Northern Colorado, Greeley, CO
Thomas M. McCabe, University of Northern Colorado, Greeley, CO
Jeffrey T. Olimpo, The University of Texas at El Paso, El Paso, TX

11:30 AM – 12:30 PM
Windows

Investigating the Enigma of Arbovirus Infections: Diseased Vertebrates, Healthy Mosquitoes

Carol D. Blair, Colorado State University, Fort Collins, CO

Arthropod-borne viruses are maintained in natural cycles that require transmission to a vertebrate host by the bite of an infected arthropod, such as a mosquito or tick. The virus must replicate in the tissues of both the vertebrate and the arthropod, and usually does not cause pathology in either of these natural hosts. However, if an arbovirus such as chikungunya, Zika, or West Nile infects an incidental vertebrate host such as a human, serious disease may result, while the mosquito vector suffers no ill effects from infection. Our research to determine the basis of this dramatic difference in infection outcomes has focused on the antiviral defense, or immune systems of humans and mosquitoes. This session will report recent research findings on RNA interference, the major anti-arboviral immune response of Aedes aegypti mosquitoes, and conjecture on the ‘molecular arms race’ responsible for its co-evolution in mosquito and virus.

11:30 AM – 12:30 PM
Silver

Regulation of Transcription to Oxidative Stress by the Conserved DksA Protein of Gram-Negative Bacteria

Andrés Vázquez-Torres, University of Colorado School of Medicine, Aurora, CO

First associated with nutritional deprivation, the “stringent response” activates or represses global gene transcription through the actions of the guanine tetraphosphate (ppGpp) alarmone and the DksA regulatory protein on the RNA polymerase (RNAP). The stringent response protects phylogenetically diverse eubacteria against a variety of environmental stress conditions and promotes the virulence of medically important pathogens such as Pseudomonas aeruginosa, Vibrio cholerae, and Salmonella enterica.
Our recent work indicates that reactive oxygen and nitrogen species elicit a stringent response in Salmonella. Our investigations have identified the zinc finger in the globular domain of DksA as a bona fide sensor of oxidative and nitrosative stress. We are actively testing the hypothesis that the sensing of reactive species by the DksA zinc finger promotes antioxidant and antinitrosative defenses, antibiotic resistance and the pathogenicity of Salmonella. Given that most Gram-negative bacteria express DksA orthologues with a conserved zinc finger, our investigations can be generalize to a variety of clinically important, and phylogenetically diverse pathogenic bacteria.

11:30 AM – 12:30 PM
Grand Ballroom I

The Microbial Ecology of Our Homes
Noah Fierer, University of Colorado, Boulder, CO

Microorganisms are ubiquitous in our homes. Although most of these microbes are innocuous, some of these household bacteria and fungi can have important impacts on human health. Unfortunately, we have a limited understanding of how these household microbial communities vary across different geographic regions or the factors that structure their biogeographical patterns. I will highlight two recent projects that leverage the power of ‘citizen science’ to investigate the microbes found inside homes. In the first set of studies, we collected dust samples from ~1,500 households across the U.S. to understand the continental-scale distributions of airborne bacteria and fungi inside homes. We assessed the diversity and sources of these airborne bacteria and fungi, yielding our first insight into how airborne microbial communities are influenced by climate, home occupants, and home design. More recently, we have been focusing on those bacteria living inside shower heads. We have found that shower heads can harbor large populations of Mycobacteria, a diverse genus of bacteria that includes both opportunistic pathogens as well as beneficial bacteria capable of modulating immune system function. We are documenting how exposures to Mycobacteria vary across the U.S. population and the potential effects of these mycobacterial exposures on human health.

LUNCH
12:30 PM – 2:00 PM
South Convention Lobby

JMBE OFFICE HOURS
(By Appointment Only – Sign-up at Registration Desk)
12:30 PM – 2:00 PM
Tower Court C

REIL-BIOLOGY POSTER SESSION
12:30 PM – 2:00 PM
Grand Ballroom Foyer

PARE GROUP MEETING
(For Current and Past PARE Instructors)
12:30 PM – 2:00 PM
Tower Court D

ART WALK
12:30 PM – 2:00 PM
Tower Court B

Micro-Art at ASMCUE: LuxArt
Mark O. Martin, Anne Estes

If you are attending ASMCUE, you love microbes. But do you like art? You may have seen ASM’s recent “Agar Art” exhibition. Mark Martin of the University of Puget Sound has a fun opportunity for ASMCUE attendees who are interested: “painting” with luminous bacteria onto Petri dishes. He will then photograph your creation the next day in the dark (alongside you if you wish, illuminated by your masterpiece!) and send it to you by e-mail. It is fun exercise for all microbiologists to try, and really spreads the word that (i) microbiology is fun, and (ii) art and science can work together!

Lab Coat Makeover
Noalani Benedict

Noalani Benedict is a microbiology undergraduate at Colorado State University who decorates labcoats with intricate designs. Her work combines art and science to add a personal flair to the normally plain labcoat. She takes commissions in hope to spread the use of labcoats as a medium to communicate scientific findings and personal statements and spark conversation.
DISSEMINATION STATION RESOURCE FAIR
12:30 PM – 2:00 PM
North Convention Lobby
Visit representatives from grant-funded programs and non-profit organizations as they share information about their projects and ways you can incorporate their materials and/or contribute to their efforts.

Partnership for Undergraduate Life Sciences Education (PULSE)
Sharon B. Gusky, Northwestern Connecticut Community College

Authentic Research Experience in Microbiology
Theodore Muth, CUNY Brooklyn College

Automated Analysis of Constructed Response (AACR) Project
Rachel Yoho, Michigan State University

National Science Foundation
Laura Regassa, National Science Foundation

Learn About the Journal of Microbiology & Biology Education
Kari Wester, American Society for Microbiology

CD4 Hunter: A Mobile Mini-game About HIV-1 Binding and Attachment
Carla Brown, Drexel University College of Medicine

Interactive Video Vignettes: Out-of-class Priming Tools to Improve Student Learning of Biology Core Concepts
L. Kate Wright, Rochester Institute of Technology

Please see the conference app for full project descriptions.

CONCURRENT SCIENTIFIC SESSIONS
2:00 PM – 3:00 PM
Windows

Metabolic Engineering of Microbes for Production of Green Fuels and Chemicals
Calvin A. Henard, National Renewable Energy Laboratory (NREL), Golden, CO

Methane (CH4), the primary component of natural gas and anaerobic digestion derived biogas, offers a promising, high-volume petroleum replacement for fuel and chemical bioprocesses. Biogas generated from anaerobic digestion of waste streams, including wastewater derived from conventional biorefineries, offers a versatile, renewable CH4 source. The potential for biogas upgrading was recently assessed by the Department of Energy (DOE), US Department of Agriculture (USDA), and the Environmental Protection Agency (EPA), as outlined in a recent Biogas Roadmap “Progress Report”, jointly crafted by the three organizations. The report outlines the strong potential for biogas to be a significant contributor to domestic renewable energy development. However, despite this potential, the gaseous state of CH4 makes for a lack of compatibility with current transportation and industrial manufacturing infrastructure, limiting its utilization as a transportation fuel and intermediate in biochemical processes. Microbial conversion of biogas to liquid fuels and value-added chemicals using natural CH4-consuming bacteria offers valorization and mitigation potential. In this presentation, the development of the CH4 biocatalysis platform at the National Renewable Energy Laboratory will be discussed, including genetic tools for use in engineering methanotrophic bacteria and a proof-of-concept CH4 to fuel and organic acid bioprocess.

2:00 PM – 3:00 PM
Windows

Chronic Wasting Disease... On the Move
Candace K. Mathiason, Colorado State University, Fort Collins, CO
Amy V. Nalls, Colorado State University, Fort Collins, CO
Erin McNulty, Colorado State University, Fort Collins, CO
Nathaniel Denkers, Colorado State University, Fort Collins, CO
Clare Hoover, Colorado State University, Fort Collins, CO
Christina J. Sigurdson, Colorado State University, Fort Collins, CO
Edward A. Hoover, Colorado State University, Fort Collins, CO

Chronic wasting disease (CWD) is the most efficiently transmitted of the prion diseases. This transmissible spongiform encephalopathy (TSE) affects free-range and captive cervid populations and has been identified in North America, Korea and Norway. Like all prion diseases, CWD is invariably fatal, and is hallmarked by a protracted asymptomatic or 'silent carrier' phase of disease. During this multiyear silent carrier phase prions are shed between susceptible hosts and into the environment they graze and live, enhancing the potential for disease transmission. One of the many intriguing questions put to CWD researchers is— 'What does an infected cervid leave behind that harbors sufficient CWD infectivity to initiate disease in a naïve susceptible cervid?' Our studies have demonstrated prion infectivity in saliva, blood, urine, feces, the pregnancy microenvironment and housing environments (water troughs, feed buckets, bedding) of both symptomatic and asymptomatic CWD-infected deer. These findings help explain the facile transmission of CWD.

2:00 PM – 3:00 PM
Windows

Zika Virus: Insights into Gathering Evidence for Causation in Science

Brian D. Foy, Colorado State University, Fort Collins, CO

I will talk about my own experience discovering that Zika virus can be sexually transmitted, and researching the subsequent Zika virus disease pandemic in the Western Hemisphere. My goal is to provide a vivid, personal and timely account of how the scientific discovery works in actuality, including the factors of serendipity, careful observation and scrutinization. In this time of fake news, students more than ever need to understand the messy but self-correcting process of how scientific discoveries progress from hunches to causal evidence.

EXHIBITOR AND POSTER SETUP
3:00 PM – 6:00 PM
Grand Ballroom II

3:15 PM – 3:45 PM
Windows

Helping Students Succeed: FYE across the STEM Curriculum

Jaclyn A. Madden, Harford Community College, Bel Air, MD

First-Year Experience (FYE) programs are designed to help students succeed in college. The goals of FYE programs focus on helping students make connections to faculty and other students, improving academic performance, and increasing persistence and graduation. FYE programs often require students to take additional courses, participate in seminars, or become members of learning communities. Credit limits and student work and life obligations can make implementation difficult. The FYE model adopted by the STEM division at Harford Community College places the teaching of skills in the courses that use them, allowing students more flexibility in their schedules while developing the skills for success. Participants will learn more about how the model implements best practices in teaching that are in alignment with how students learn, provides easy-to-access professional development to full time and adjunct faculty, and provides an opportunity to implement a successful FYE program without adding an additional course requirement.

3:15 PM – 3:45 PM
Silver

Workforce: Microbiology at NREL

Sandra F. Notonier, National Renewable Energy Laboratory (NREL), Golden CO

The National Renewable Energy Laboratory (NREL) offers opportunities for visiting faculty program, and internships for community college, undergraduate, and graduate students to work in a variety of research laboratories. Such programs provide rewarding experiences by allowing young scientists to perform research in state-of-the-art facilities. Scientific and technical staff serve as mentors and advisors by training students on using innovative techniques. Along with the exciting scientific project conducted, guidance and support to develop and to improve experimental planning, scientific literature acquisition, technical writing as well as oral/poster presentation are also provided.
Pseudomonas putida KT2440 is a soil microorganism displaying high robustness, resistance to oxidative stress, and natural ability to catabolize aromatics. As part of the biomass team, we apply a large variety of techniques using this remarkable microbial host to convert lignin into relevant industrial intermediates. By joining the biomass group, interns or visiting students have a great opportunity to learn cutting-edge technology in metabolic engineering and synthetic biology, while enhancing our collective knowledge on microbial lignin deconstruction mechanisms.

3:15 PM – 3:45 PM
Tower Court A
Student Learning: A Global Perspective
International Educator Panel, 2017 ASMCUE Leadership Grant Program for International Educators

Ever wonder what students and teaching in higher education are like in other countries? Come meet recipients of the 2017 ASMCUE Leadership Program for International Educators, share experiences and hear about their exciting innovations.

3:15 PM – 3:45 PM
Tower Court D
The PULSE Program: An Overview
Heather M. Seitz, Johnson County Community College, Overland Park, KS
Karen K. Klyczek, University of Wisconsin, River Falls, WI
Sharon B. Gusky, Northwestern Connecticut Community College, Winsted, CT

In this session participants will learn about PULSE and PULSE’s unique strategies to implement the Vision and Change report (2011) recommendations through departmental change at their own institution. Programs and activities that are used by the Partnership for Undergraduate Life Science Education (PULSE) will be introduced.

3:50 PM – 4:20 PM
Windows
Navigating the Challenges of Effective Teaching and Learning at Today’s Community Colleges
Jennifer A. Herzog, Herkimer County Community College, Herkimer, NY

This session will be an important networking opportunity for recent graduates and current community college faculty alike. For recent graduates, it will provide them with a realistic view of life at a two-year college: from the instructor’s standpoint and from that of the current student population. Since many may start their educational careers as adjunct instructors at such institutions, this session will allow them to walk away with resources to better prepare themselves for success inside the classroom and out. For current community college faculty, this will be a time to share best practices as well as their concerns based upon their own experiences—which often go unheard at home institutions due to time constraints or lack of a venue to do so. The session will begin with a brief overview of major hurdles to student success at two-year colleges. It will then continue into an active learning portion, where participants will engage as students in effective teaching and learning practices. The session will close with an open forum designed to help participants recognize additional challenges in the life of a community college instructor and discuss how they can develop their own successful strategies for navigating these logistical and educational challenges.

3:50 PM – 4:20 PM
Silver
Workforce: Microbiology in a Brewery
Kelly Tretter, New Belgium Brewing Company, Fort Collins, CO

Please see the Guidebook Mobile App for program updates.

3:50 PM – 4:20 PM
Tower Court A
Student Learning: Diversity and Inclusion
Ria Vigil, Colorado State University, Fort Collins, CO

Please see the Guidebook Mobile App for program updates.
3:50 PM – 4:20 PM
Tower Court D

Catalyzing Change within Your Department Using the PULSE Ambassador Program
Karen K. Klyczek, University of Wisconsin, River Falls, WI
Sharon B. Gusky, Northwestern Connecticut Community College, Winsted, CT
Heather M. Seitz, Johnson County Community College, Overland Park, KS

In this session participants will learn about strategies to implement Vision and Change Report (2011) recommendations through departmental change at their own institution. Programs and activities that are used by the Partnership for Undergraduate Life Science Education (PULSE) will be introduced, highlighting the Ambassador program. Ambassadors share facilitative leadership strategies to catalyze discussions within departments that aid in creating an inclusive, student-centered and evidence-based life science program for students. The history of the program and lessons learned will be shared. Finally, presenters will also discuss opportunities to have a PULSE ambassador visit at your institution.

4:25 PM – 4:55 PM

Considering Students' Spatial Reasoning When Deciding the Types of Models (2D vs. 3D) to Teach Molecular-Level Processes
Lacy M. Cleveland, University of Northern Colorado, Greeley, CO
Thomas M. McCabe, University of Northern Colorado, Greeley, CO

Advocates of second generation biology education research emphasize the importance of understanding how individual student characteristics impact the effectiveness of active-learning strategies. This session will specifically address how students' spatial reasoning plays a role in learning. In general, spatial reasoning is known to impact academic STEM performance. Specifically, for microbiology and other molecular-based disciplines, an individuals’ spatial ability influences the learners’ ability to visualize and comprehend abstract molecular processes. We will provide a literature review and self-collected data demonstrating the impact of spatial reasoning on learning from 2D versus 3D models. Our own research agenda values the use of kinesthetic activities that allow students to 'play the part' of molecular machinery, promoting student engagement by staging students amidst a macroscopic, 3D model of a molecular process. Attendees will gain insight into the influence of students’ inherent abilities on their learning and gain a toolbox of models that may be modified and implemented into their own molecular biology teaching.

4:25 PM – 4:55 PM
Silver

Workforce: Microbiology in the Food Science Industry
Larry Steenson, Leprino Foods, Denver, CO

Please see the Guidebook Mobile App for program updates.

4:25 PM – 4:55 PM
Tower Court A

Student Learning: Diverse Students in Diverse Settings: Increasing Discipline-Based Education Research in Community Colleges
Heather M. Seitz, Johnson County Community College, Overland Park, KS
Shannon B. Seidel, Pacific Lutheran University, Tacoma, WA

Surprisingly, even though over 50% of undergraduate biology students attend a community college, the published research on learning in undergraduate classrooms is overwhelmingly done in four-year university settings. In this session we will have an opportunity to share the challenges and obstacles faced by community college faculty in conducting discipline-based education research. We will discuss opportunities for community college faculty to gain skills in conducting education research and share ideas for obtaining support for this work. Finally, we will highlight strategies to partner with local four year institutions to create cohesive partnerships to study how all students learn biology.

24th Annual ASM Conference for Undergraduate Educators, Denver, Colorado
Using the PULSE Snapshot Rubrics to Assess Alignment with the Vision and Change Recommendations

Sharon B. Gusky, Northwestern Connecticut University, Winsted, CT
Karen K. Klyczek, University of Wisconsin, River Falls, WI
Heather M. Seitz, Johnson County Community College, Overland Park, KS

During this session participants will learn about the tools and resources developed by Partnership for Life Sciences Education (PULSE) to assist with departmental change. They will use the PULSE Vision & Change Snapshot Rubric to assess their curricular alignment with Vision and Change. The participants will discuss ways to use the data from the Snapshot rubrics to facilitate change in their department. The role of the Rubrics in PULSE’s Ambassador’s Program, which provides skilled facilitators to help departments develop their vision and a plan for change, and the Recognition program which recognizes the progress of departments as they move from vision to change will be discussed. A copy of the Snapshot Rubrics as well as information about the PULSE programs and resources can be found at www.pulsecommunity.org.

PLENARY LECTURE
5:15 PM – 6:15 PM
Grand Ballroom I

Institutional Transformation: Models and Strategies of Institutional Change in Practices for Undergraduate Teaching and Research

Sylvia Hurtado, UCLA Graduate School of Education & Information Studies

Dr. Hurtado will share lessons learned from 12 years of studying students, faculty and institutions involved in addressing expansion of opportunities for undergraduate success in science disciplines. She will share traditional frameworks of institutional change as well as emergent models that come from working with campus case studies of exemplary institutions. Evidenced-based practice, as well as novel approaches that expand the evidence base for practice, are essential for diffusing innovations that improve the concept of inclusive science for student success.

EXHIBIT OPENING & RECEPTION
6:30 PM – 8:30 PM
Grand Ballroom II
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Details</th>
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<tbody>
<tr>
<td>7:00 AM – 4:30 PM</td>
<td><strong>ASMCUE Registration Desk Open</strong>&lt;br&gt;South Convention Lobby</td>
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<tr>
<td>7:00 AM – 7:45 AM</td>
<td><strong>Networking Breakfast by Location</strong>&lt;br&gt;South Convention Lobby</td>
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<td>7:15 AM – 7:45 AM</td>
<td><strong>Focus Group – By Invitation Only</strong>&lt;br&gt;Pearson Colorado</td>
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<td>8:00 AM – 9:00 AM</td>
<td><strong>Plenary Lecture</strong>&lt;br&gt;Understanding the Evolution of the Host-Associated Microbiome&lt;br&gt;Se Jin Song, University of California, San Diego, San Diego, CA&lt;br&gt;Grand Ballroom I</td>
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<td>9:00 AM – 3:30 PM</td>
<td><strong>Exhibitor Hall Open</strong>&lt;br&gt;Grand Ballroom II</td>
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<td>9:15 AM – 10:15 AM</td>
<td><strong>Poster Session A</strong>&lt;br&gt;Grand Ballroom II</td>
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<td>9:30 AM – 10:30 AM</td>
<td><strong>Product Corner</strong>&lt;br&gt;MiniOne Systems&lt;br&gt;Gold</td>
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<td>9:30 AM – 10:30 AM</td>
<td><strong>Product Corner</strong>&lt;br&gt;Carolina Biological Supply&lt;br&gt;Carolina Biological Supply Exhibit Booth – Grand Ballroom II</td>
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<td>10:00 AM – 10:30 AM</td>
<td><strong>Product Corner</strong>&lt;br&gt;McGraw-Hill Education&lt;br&gt;Century</td>
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<td>10:00 AM – 10:30 AM</td>
<td><strong>Product Corner</strong>&lt;br&gt;Pearson Colorado</td>
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<td>10:00 AM – 10:30 AM</td>
<td><strong>Author Corner</strong>&lt;br&gt;W. W. Norton &amp; Company, Inc.&lt;br&gt;W. W. Norton Exhibit Booth – Grand Ballroom II</td>
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<td>11:30 AM – 12:25 PM</td>
<td><strong>Microbrew Sessions (I of III)</strong>&lt;br&gt;Various Locations&lt;br&gt;Session A: 11:30 AM&lt;br&gt;Session B: 11:50 AM&lt;br&gt;Session C: 12:10 PM</td>
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<td>12:30 PM – 1:30 PM</td>
<td><strong>Lunch</strong>&lt;br&gt;South Convention Lobby</td>
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<td>12:45 PM – 1:15 PM</td>
<td><strong>Focus Group – By Invitation Only</strong>&lt;br&gt;Pearson Colorado</td>
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<td>1:30 PM – 2:30 PM</td>
<td><strong>Poster Session B</strong>&lt;br&gt;Grand Ballroom II</td>
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<td><strong>Product Corner</strong>&lt;br&gt;miniPCR&lt;br&gt;Gold</td>
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<td><strong>Product Corner</strong>&lt;br&gt;McGraw-Hill Education&lt;br&gt;Century</td>
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<td>1:30 PM – 2:00 PM</td>
<td><strong>Author Corner</strong>&lt;br&gt;W.W. Norton &amp; Company, Inc.&lt;br&gt;<em>W.W. Norton Booth – Grand Ballroom II</em></td>
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<td>1:30 PM – 2:00 PM</td>
<td><strong>Author Corner</strong>&lt;br&gt;Pearson&lt;br&gt;<em>Colorado</em></td>
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<td>2:15 PM – 2:30 PM</td>
<td><strong>Scavenger Hunt Raffle Prize Drawing</strong>&lt;br&gt;<em>Grand Ballroom II</em></td>
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<td>2:30 PM – 3:25 PM</td>
<td><strong>Microbrew Sessions (II of III)</strong>&lt;br&gt;<em>Various Locations</em>&lt;br&gt;Session D: 2:30 PM&lt;br&gt;Session E: 2:50 PM&lt;br&gt;Session F: 3:10 PM</td>
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<td>3:45 PM – 4:40 PM</td>
<td><strong>Microbrew Sessions (III of III)</strong>&lt;br&gt;<em>Various Locations</em>&lt;br&gt;Session G: 3:45 PM&lt;br&gt;Session H: 4:05 PM&lt;br&gt;Session I: 4:25 PM</td>
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<td>5:00 PM – 7:00 PM</td>
<td><strong>Director’s Choice: HHMI Night at the Movies</strong>&lt;br&gt;<em>Grand Ballroom I</em></td>
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<td>7:00 PM</td>
<td><strong>Dinner on Your Own</strong></td>
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IDENTIFY YOUR COMMUNITY DAY

Wear your “community” colors and represent your institution type so you can identify and network with your colleagues.

Community College = BLUE
Primarily Undergraduate Institution = GREEN
Comprehensive University = ORANGE
Doctoral-Degree Granting University = RED
International = PURPLE

BREAKFAST BY LOCATION
7:00 AM – 7:45 AM
South Convention Lobby

ASM’s supports thirty-five Branches organized by geographical territories that are defined by one or more states and/or zip code areas. On site, attendees will receive information about their branch and region, be encouraged to meet others in the same vicinity, and plan branch activities. International attendees will have an opportunity to meet as well.

FOCUS GROUP – BY INVITATION ONLY
7:15 AM–7:45 AM
Colorado
Sponsored by Pearson

PLENARY LECTURE
8:00 AM – 9:00 AM
Grand Ballroom I

Understanding the Evolution of the Host-Associated Microbiome

Se Jin Song, University of California, San Diego

Current research is redefining what we think of as a typical animal or human. An animal is really one large organism and a lot of little ones that include viruses, bacteria, and protists. Evolutionary speaking, they are inseparable: hosts and their microbes (and their genes) are intertwined over long periods of evolutionary history. These types of coevolutionary patterns aren’t surprising given the symbiotic nature of their relationship. For example, animals provide stable nutrient-rich habitats for microbes, while microbes provide a variety of functions for the animal, affecting the host’s physiology, nutrition, immune function, reproduction, and even behavior. Yet, the specific assemblages of microbes we see are extremely diverse across hosts and can be dynamic over time in a given host. We are just beginning to appreciate and understand the diversity and more importantly, the functions of these complex communities of organisms that live inside of us and other animals. In this talk, I will give a broad overview of how these unseen microbes make us who we are and how they may have helped shape animal evolution.

EXHIBITOR SHOWCASE
9:00 AM – 3:30 PM
Grand Ballroom II

POSTER SESSION A
9:15 AM – 10:15 AM
Grand Ballroom II

The 2017 abstracts are organized by both content and pedagogy to help participants navigate more easily through the poster session. The content themes are based upon the ASM Recommended Curriculum Guidelines for Undergraduate Microbiology Education (www.asm.org/index.php/guidelines/curriculum-guidelines). The guidelines identify six overarching concepts, which provide a framework for 22 key microbiological topics, and two key skills and are based on concepts put forth in the 2011 national report, Vision and Change in Undergraduate Biology: A Call to Action. The ASM concepts and topics were selected to promote deep understanding of core concepts that are deemed to be of lasting importance beyond the classroom. Likewise, students’ development of competency in the selected skills will have enduring and lasting value beyond both the classroom and laboratories.

For the purposes of ASMCUE, a seventh concept, advancing STEM education and research, has been added to the abstracts in order to identify authors working in this broader-scoped area. The seven concepts are therefore: evolution, structure and function, pathways, information flow, systems, the impact of microorganisms, and advancing STEM education and research.

The pedagogy themes are organized into five categories: course design, hands-on projects, student learning, teaching approaches, and teaching tools.

Each abstract is assigned to both content and pedagogy themes. These assignments, designated by the submitting author, are indicated for each abstract.
Abstracts are found in the Journal of Microbiology & Biology Education, Volume 18, Issue 2, which is available both online and on-site. Late-breaking abstracts are found in the Guidebook Mobile App.

1-A
Does a Discovery-Based Activity about Herd Immunity Change Student Attitudes about Vaccination?
Rebecca Rashid Achterman, Bastyr University
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning, Teaching approaches

3-A
Concept Inventory Development Reveals Common Student Misconceptions about Microbiology
Amy Briggs, Beloit College
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Teaching tools

5-A
Monitoring Student Learning Outcomes in a Course-Based Undergraduate Research Experience Focused on Next Generation 16S Sequencing
Amanda Cottone, University of Pennsylvania
ASM Curriculum Guideline Concept(s): Impact of microorganisms, Advancing STEM education and research
Pedagogical Category(ies): Student learning

7-A
Impact of Formative Assessments on Student Learning in Bioinformatics
Sagarika Dash, Glendale Community College
ASM Curriculum Guideline Concept(s): Information flow, Advancing STEM education and research
Pedagogical Category(ies): Student learning

9-A
Implementation of a Biology Concept Assessment Tool (BCAT) for Nonmajors Biology
Melissa Eslinger, US Military Academy, West Point
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Course design, Teaching tools

11-A
Analysis of Student Performance in Allied Health Microbiology Versus Performance in Three Different Prerequisite Courses
Marsha Gaston, University of Cincinnati Blue Ash College
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning

13-A
Assessment of Misconceptions and Prior Knowledge in a Microbiology Course Using a Concept Inventory
Julie Grainy, University of Georgia
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning

15-A
Joanna Klein, University of Northwestern–St. Paul
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Teaching approaches

17-A
Assessment of a Large Course Redesign in a General Microbiology Lecture
Alice Lee, North Carolina State University
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Course design, Student learning
19-A
Weekly Reflective Writing Regarding an In-Course Research Project Led to More Understanding of the Process of Science and the Development of Skills and Attributes of a Scientist
Jennifer O’Connor, Rose-Hulman Institute of Technology
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning

21-A
The Effect of Concept Surveys on Test Scores in a Nonmajors Biology Course
Christopher Parker, Texas Wesleyan University
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning

23-A
Qualitative Analysis of Perceived Difficulties with and Future Applications of General Microbiology Laboratory Knowledge and Skills
Andrea Rediske, University of Central Florida
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning

25-A
Student Metacognitive Skills and Exam Performance Increase when Metacognition Instruction is Embedded in an Introductory Biology Course
Jessica Santangelo, Hofstra University
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning

27-A
Classroom Module Versus Apprenticeship: Learning Gains and Confidence Differences of Cloning Knowledge and Skills
Emily Smith, Middle Tennessee State University
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning

29-A
Interdisciplinary Service Learning Project for Water Quality and Supply Assessment in Low-Income Homes of Barrio San Agustín, San Francisco Solano, Buenos Aires Metropolitan Area–Argentina
Diana Vullo, Universidad Nacional General Sarmiento
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Hands-on projects, Teaching approaches

PRODUCT CORNER
9:30 AM – 10:30 AM
Gold
Sponsored by MiniOne Systems
Presenter: Richard Chan
Come see a demo of how you can use our electrophoresis and PCR systems for teaching hands-on molecular biology labs in one class session. Our systems simplify classroom management with minimal prep work, engage students with hands-on participation and inquiry-based learning, and provide real world experiments. Our MiniLabs are complete kits for teaching topics such as DNA fingerprinting, DNA forensics, DNA amplification, genetics, and food borne outbreaks.
PRODUCT CORNER  
9:30 AM – 10:00 AM  
Carolina Biological Supply Exhibit Booth – Grand Ballroom II

Sponsored by Carolina Biological Supply  
Presenter: Stephanie Songer

Carolina Distance Learning makes safe, rigorous lab kits for your microbiology students. Our product corner will highlight a variety of microbiology investigations, and afford attendees the opportunity for hands-on examination of lab materials.

PRODUCT CORNER  
9:30 AM – 10:00 AM  
Century

Sponsored by McGraw-Hill Education  
Presenter: Heidi Smith

How Digital Tools Enhance Active Learning in the Classroom

Designing and implementing active learning strategies can be time-consuming, but it doesn’t have to be that way. Come participate in some group activities taken directly from ConnectTM Microbiology and adopted for implementation in many different types of classroom settings within minutes.

PRODUCT CORNER  
9:30 AM – 10:00 AM  
Colorado

Sponsored by Pearson  
Presenters: Derek Weber and Warner Bair

With many Microbiology students interested in pursuing clinical careers, relating concepts of Microbiology to clinical practice helps to engage and motivate learners. This session will highlight newly developed content available for the 13th edition of Microbiology: An Introduction, which allows instructors to integrate clinical concepts into their course. See how “In the Clinic Video Tutorials” and “Clinical Case Learning Catalytics Activities” place chapter content into clinical context while new “Ready-To-Go Modules” aids instructors in the integration of this clinical content into their courses.

AUTHOR CORNER  
10:00 AM – 10:30 AM  
W. W. Norton Exhibit Booth – Grand Ballroom II

Sponsored by W. W. Norton  
Featured Author: John W. Foster

Flipping the Paradigm: How Patient Mysteries Drive Learning

Coauthor John Foster will discuss the how the team behind Microbiology: The Human Experience devised their method of using patient “mysteries” to introduce core concepts of microbiology, immunology and infectious disease. He will illustrate how a patient mystery approach can draw students into chapter content and enhance flipped classroom approaches. Examples of case study small group activities will be presented.

PRODUCT CORNER  
10:00 AM – 10:30 AM  
Colorado

Sponsored by Pearson  
Presenter: Terry Austin

Are you interested in helping your students with some outstanding online resources? Or looking to try something new? Professor Terry Austin has been using MasteringMicrobiology for the past seven years. In this workshop, he will share strategies and best practices for using Mastering Microbiology and Learning Catalytics. Resources from Mastering Microbiology are invaluable as students master challenging lecture concepts, lab safety procedures and complex lab techniques. Learning Catalytics can assess student confidence in lecture and lab, as well as facilitate students sharing lab data. Come join Terry to learn more about how to help your students have a successful microbiology learning experience.
PRODUCT CORNER
10:00 AM – 10:30 AM
Century

Sponsored by McGraw-Hill Education
Presenter: Michael Troyan

How LearnSmart LabsTM Prepare Students for the On-Campus Laboratory Course

With the development of distance learning, online education and degree offerings at many institutions, students and faculty see the value of participating in rigorous degree programs. In the biological sciences online degree offerings have been limited by the notion that science laboratory experiences cannot be effectively done online. The convergence of adaptive learning technology and computer simulations have begun to challenge this assertion. Rather than consider this a matter exclusively for online learning, perhaps it is time to think about how technologies developed for online learning can be leveraged to provide advantages to students taking traditional on campus laboratory courses. What can virtual labs do to enhance the on campus laboratory course by increasing efficiency and pedagogical impact? Come join the discussion on this important topic.
Interested in Teaching or Improving Student Learning?

Apply for an ASM Course!

**Disciplinary Based Education Research (DBER) Design and Implementation**

The ASM has trained over 300 faculty, through the ASM/NSF Biology Scholars Program, in the development and testing of interventions and strategies designed to increase student learning. The principles of this training are now being offered online through the Hot Topics in Microbiology Education Course. Participants will learn how to design classroom or laboratory education research investigations, posing significant student learning questions that can be investigated empirically. The course syllabus includes a focus on building discipline-based education research skills, pre- and post-webinar assignments, in-depth training, and a faculty mentoring community dedicated to supporting leaders interested in advancing education reform.

**Registration Deadline:** August 28, 2016  
**Course Dates:** September 2016 - December 2016

**Best Practices in Curriculum Design, Teaching and Assessment**

The ASM has trained over 300 faculty, through the ASM Science Teaching Fellows Program in the exploration of student-centered teaching and development of skills needed to succeed in positions that have a significant teaching component. The principles of this training are now being offered online through the Best Practices in Curriculum Design, Teaching and Assessment Course. This 5-month, online development opportunity prepares you for science teaching positions at a variety of non-doctoral institutions, such as, community colleges, minority-serving institutions, regional or state colleges, and primary undergraduate institutes. Participants in the course take part in a highly focused training experience that combines in-depth webinars, pre- and post-webinar assignments, structured mentoring, and a community of practice. The experience is fast-paced, intense, interactive, and presents practical examples in microbiology education.

**Registration Deadline:** November 15, 2016  
**Course Dates:** December 2016 - April 2017

For more information, visit:  
www.asm.org/index.php/build-your-skills
**MICROBREW SESSION I OF III**  
**SATURDAY, JULY 28**

### ROOM LOCATION

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<th>Tower Court B</th>
<th>Tower Court C</th>
<th>Tower Court D</th>
<th>Silver</th>
<th>Spruce</th>
<th>Denver</th>
</tr>
</thead>
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### MICROBREW A: 11:30 AM – 11:45 AM

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<tr>
<th>Title</th>
<th>Speaker</th>
<th>Institution</th>
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<tr>
<td>Next-Gen Genome Solver: From Training to Community Science Projects</td>
<td>Gaurav Arora</td>
<td>Gallaudet University</td>
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<tr>
<td>Engaging the Sense of Touch in the Classroom</td>
<td>Jeremy Chandler</td>
<td>University of Tennessee</td>
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<tr>
<td>Problem-Based Microbiology Capstone Course</td>
<td>Rachel Watson</td>
<td>University of Wyoming</td>
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<tr>
<td>Home Kitchen Microbiology – A Sourdough Bread-Baking Project and Blog</td>
<td>Tina Salmassi</td>
<td>California State University, Los Angeles</td>
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<tr>
<td>Case-Based Methodology for Effective Student Development of Concepts and Quantitative Analyses</td>
<td>Rodney Anderson</td>
<td>Ohio Northern University</td>
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<tr>
<td>3D-Printed Models to Help Students Learn How Antibodies Bind to Epitopes on Antigens</td>
<td>Erica Suchman</td>
<td>Colorado State University</td>
</tr>
<tr>
<td>Introducing Troubleshooting to Undergraduate Laboratory Settings</td>
<td>Nina Martin</td>
<td>Johns Hopkins Bloomberg School of Public Health</td>
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### MICROBREW B: 11:50 AM – 12:05 PM

<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
<td>Mining the Immune Epitope Database to Investigate Cross-Reactive Epitopes between Zika Virus and Myelin Basic Protein</td>
<td>Huda Makhluf</td>
<td>National University</td>
</tr>
<tr>
<td>Math of Microbiology: An Approach to Increase Math Skills in Undergraduate Science Majors</td>
<td>Jason Baker</td>
<td>Missouri Western State University</td>
</tr>
<tr>
<td>An Active Learning Approach to Reading the Primary Literature: Designing and Implementing a Bacteria and Bacterial Infections Online Course Using a “Pet Pathogen”</td>
<td>Elise Mosser</td>
<td>Drexel University College of Medicine</td>
</tr>
<tr>
<td>Specs Grading: Motivating Students While Simplifying Grading</td>
<td>Jennifer O’Connor</td>
<td>Rose-Hulman Institute of Technology</td>
</tr>
<tr>
<td>Developing Interrupted Case Studies to Increase Student Interactions with Real Data and Primary Literature Sources</td>
<td>Michele Culumber</td>
<td>Weber State University</td>
</tr>
<tr>
<td>Effective Methods for Implementation and Evaluation of Game-Based Learning (GBL) for Micro</td>
<td>Carla Brown</td>
<td>Drexel University College of Medicine</td>
</tr>
<tr>
<td>Introducing Troubleshooting to Undergraduate Laboratory Settings</td>
<td>Revati Masilamani</td>
<td>Tufts University School of Medicine</td>
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### MICROBREW C: 12:10 PM – 12:25 PM

<table>
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<tr>
<th>Title</th>
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<th>Institution</th>
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</thead>
<tbody>
<tr>
<td>Infectious Disease Outbreak and Herd Immunity Simulation – With a Visual Appeal</td>
<td>Johanna Schwingel</td>
<td>St. Bonaventure University</td>
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<tr>
<td>An Interdisciplinary Laboratory Experience for Microbiology and Physics Students</td>
<td>Matthew Domek</td>
<td>Weber State University</td>
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<tr>
<td>Stressing Escherichia coli to Educate Students about Research: A CURE to Investigate Multiple Levels of Gene Regulation</td>
<td>Celeste Peterson</td>
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<td>Decreasing the Barrier Imposed on Learning by Multiple-Choice Exams</td>
<td>Timothy Paustian</td>
<td>University of Wisconsin-Madison</td>
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<tr>
<td>Adaptation of Small-Group Case Studies for Use in Larger (&gt;75 Students) Classroom Settings</td>
<td>Michaela Gazdik Stofr</td>
<td>Utah Valley University</td>
</tr>
<tr>
<td>The Meselson-Stahl Experiment: An Activity Using Models for DNA Replication to Predict Experimental Results</td>
<td>Nickie Cauthen</td>
<td>LaGrange College</td>
</tr>
<tr>
<td>Use of a Reading/Writing Assignment Based on Popular Literature to Engage Students in Introductory Microbiology</td>
<td>Tracy O’Connor</td>
<td>Mount Royal University</td>
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</tbody>
</table>
MICROBREW SESSIONS (I OF III)
11:30 AM – 12:25 PM
(7 Sessions)

These grassroots sessions, arranged by topics, provide a forum for sharing best practices and interesting activities used in laboratory and classroom teaching. Presentations are simple “chalk talks” (e.g., no PowerPoint) to facilitate informal discussion. Unlike the poster sessions, Microbrews do not require assessments. Sessions will be facilitated by volunteer attendees in order to make certain each presentation stays within the 15-minute presentation (10-minute presentation and 5 minutes for discussion). Sessions must stay on time so attendees are able to move from room to room quickly to see their desired session.

Session Room Facilitators:

Tower Court A
Facilitator: Archana Lal, Independence Community College

Tower Court B
Facilitator: Elizabeth Danka, University of North Carolina – Chapel Hill

Tower Court C
Facilitator: Shannon Ulrich, St. Petersburg College

Tower Court D
Facilitator: Vicki Isola, Hope College

Silver
Facilitator: Robert Maxwell, Georgia State University

Spruce
Facilitator: Mark Randa, Cumberland County College

Denver
Facilitator: Craig Phelps, Rutgers, The State University of New Jersey

MICROBREW A: 11:30 AM – 11:45 AM

Next-Gen Genome Solver: From Training to Community Science Projects

Gaurav Arora (1), Vinayak Mathur (2) and Anne G. Rosenwald (2), (1) Gallaudet University, Washington, DC, (2) Georgetown University, Washington, DC.

Tower Court A

Genome Solver is an NSF-funded project for faculty training in bioinformatics. Recently, the Genome Solver team developed a Community Science Project that explores horizontal gene transfer (HGT) between bacteria and the phages that infect them by investigating the vast wealth of phage and bacterial sequences currently in public databases. Our own work has demonstrated that undergraduates can produce publishable data using this approach.

We invite faculty and their students to participate in the search for additional examples of this type of HGT. All that is needed is a computer, an Internet connection, and enthusiasm for research. By crowd-sourcing this question, and collecting the data from a variety of small projects under the umbrella of the Genome Solver Community Science Project, we hope to better understand the role of HGT in bacterial evolution. Next-Gen Genome Solver is supported by a grant from the National Science Foundation (DUE 1505102).

ASM Curriculum Guideline Concept(s): Evolution, Impact of microorganisms

Engaging the Sense of Touch in the Classroom

Jeremy Chandler, University of Tennessee, Knoxville, TN.

Tower Court B

Information processing is known to rely heavily on sensory inputs. Throughout human evolution dissemination of knowledge has relied on our five traditionally recognized senses; opthalmoception (sight), audioception (hearing), gustaoception (taste), olfacoception (smell), and tactioception (touch). Today in the modern college lecture course, many instructors rely solely on sight and hearing to convey knowledge and help guide the learning process. For many students the other senses, notably touch, are often absent.

With modern advances in additive manufacture (3D printing), the ability to bring customized and dimensionally accurate models that can be physically manipulated into classroom activities is increasingly at instructors’ fingertips. 3D printing most certainly does hold the most promise for rapid prototyping applications, however it is not the only source for creating tactile learning modules and props. In this session, I hope to convince you of the benefits of incorporating tactile interactions and demos into your classroom curriculum, whether you instruct a large lecture class of 300 or a small group of 30. We will explore various models generated by 3D printing, as well as, other methods and demonstrations to engage your students using tactile experiences.

ASM Curriculum Guideline Concept(s): Evolution, Cell structure and function
**Problem-Based Microbiology Capstone Course**  
**Rachel M. Watson**, University of Wyoming, Laramie, WY.  
*Tower Court C*

University of Wyoming's Senior Microbiology Majors engage in a culminating Capstone course that allows them to conceptualize, propose and perform original lab research projects that address the problems of diverse community partners. One of these partners is a downtown clinic that provides health care to low-income and uninsured residents. The other community partners are local farms, gardens and suppliers that support sustainable community agriculture. Community partners present to students during the first week of the semester. Students then assess partners' needs and write an NSF-style grant proposal detailing the approach that they will take to address partners' problems. Next, students test their hypotheses in the lab and finally they present their findings in the form of a poster presentation. In this Microbrew session, the development of this type of problem-based, service-based course will be shared as will the successes of this course in enabling direct assessment of programmatic student learning outcomes and transformational student growth.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research, Microbiology laboratory skills

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**Home Kitchen Microbiology – A Sourdough Bread-baking Project and Blog**  
**Tina Salmassi**, California State University, Los Angeles  
*Tower Court D*

Cal State LA's Applied and Environmental Microbiology Course asks students to spend three weeks cultivating wild yeast and bacteria in their home kitchens. Throughout the process, they blog about the process and discuss the microbiology they understand is taking place. During the maturation process, the students monitor their culture and assess the gas production and fermentation taking place prior to reaching the baking portion of the "experiment." Once the culture matures, the students use the wild microbes to produce the leaven for the baking of sourdough bread at home. Throughout the process, students photograph and blog about their project and are encouraged to share their experience with their community (family, friends, and peers from the course). The culmination of the project is the baking of sourdough bread. Completed blogs are then evaluated by myself and by other students in the course. Throughout the process, students are encouraged to dig deeper into the fermentation microbiology taking place in their kitchen. In my evaluation and the peer evaluations the projects are assessed for (a) the writing quality/blog layout and readability, (b) the science content of the project, (c) the amount of activity the project site received, and (d) the overall effort evidenced by the detail and appearance of the blog.

Once the blogs have been evaluated, students vote on the most "artisanal" loaf of bread baked. The voting process is fun and friendly and students are also asked to reflect on the whole experience. In the multiple iterations of this project, I have learned students are excited to put microbiology to work in their homes and some students also choose to keep their cultures alive for future baking projects. This experience creates a personal connection between students and microbiologists and the blogging aspect makes the project very contemporary and relevant.

**ASM Curriculum Guideline Concept(s):** Impact of microorganisms, Advancing STEM education and research

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**Case-Based Methodology for Effective Student Development of Concepts and Quantitative Analyses**  
**Rodney Anderson**, Ohio Northern University, Ada, OH.  
*Silver*

The purpose of this microbrew is to present a three tiered case-based method for presenting concepts that require a quantitative component and to present practical methods for developing cases for use in lectures, for cooperative learning groups and for assessment. Case studies are an effective way for students to develop needed critical thinking and analysis skills. Concepts in epidemiology are often linked with quantitative analyses that require a student to master multiple skills. To help students develop these skills, concepts are first presented using case studies during lecture presentations using real-world examples. These concepts are then reinforced through cooperative learning case-based projects that include quantitative components. Finally, cases are used as individual assessment tools to help evaluate the integration of concepts and quantitative analysis skills. This tiered approach provides students with a more realistic understanding of concepts in
epidemiology and has been a more effective method for student learning. One challenge in using this approach is developing sufficient current, real-world cases that apply to the material being covered in class. Additional case studies for use in cooperative learning groups and for classroom assessment are developed from primary literature. Finding pertinent topics is relatively straightforward. The challenges of finding data that can be used directly or transformed into a form meaningful for students will be discussed.

**ASM Curriculum Guideline Concept(s):** Impact of microorganisms

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**3D-Printed Models to Help Students Learn How Antibodies Bind to Epitopes on Antigens**

**Erica Suchman** and Jennifer McLean, Colorado State University, Fort Collins, CO.

**Spruce**

In this Microbrew session, we will mimic a flipped classroom activity we have conducted for over eight semesters at Colorado State University to help students learn how antibody structure relates to epitope binding, how antibody binds to epitopes, and how antigens and epitopes are related. While we have used this activity only in our general microbiology course for majors, it would be appropriate for use in other classes such as immunology, biology and courses in allied health sciences. The activity is suitable for use in small and large enrollment courses alike, and can be carried out in almost any classroom format, including lecture halls with small desks. Before coming to class on the day of the activity, students are required to watch a short lecture capture video on B cells, antibodies, antigens and epitopes. To ensure that students are prepared for class, they must also complete a short, online quiz before the flipped class starts. In class, students are given two magnetic antibodies with interchangeable heavy and light chains, and one virus with “spikes” made of various shapes that represent different epitopes. Students are first asked to identify the antibody light chains and heavy chains, as well as the viral antigen and potential epitopes on the virus. The instructor may use PowerPoint slides or a DocCam to give them feedback. Next, the instructor asks a series of clicker questions, that in order to answer correctly, students must manipulate the pieces to determine which antibody heavy and light chain combinations bind to epitope shapes on the virus and which do not. Survey results indicate that students think this activity helped them learn how antibody binds to epitopes on antigens.

**ASM Curriculum Guideline Concept(s):** Cell structure and function, Microbial systems

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**A Flipped Classroom Approach to Teaching Students How to Communicate Science**

**Nina M. Martin,** Gundula Bocsh, and Alan Scott, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD.

**Denver**

How many of your students pass introductory courses without knowing that antibiotics cannot be used to treat a cold? Can your average science major convince a non-major why they should learn about proteins? Pre-course surveys to my Johns Hopkins University undergraduate course, Communicating Science: Skills to Analyze & Communicate Science News have revealed some shocking answers. Although 100% of students could define virus versus bacteria, 75% stated the antibiotics could be used to treat a cold. Similarly, 100% of students could define protein, but 0% knew how to communicate to non-majors. This implicates a larger problem among science majors & their contribution to the spread of misinformation.

The way we communicate science is integral to the life of a scientist. From convincing the public to accept health interventions to showing grantors the importance of research. Despite this, there remains little practical training for scientists or students. Teaching science communication requires incorporating a diverse set of engaging teaching methods that motivates students to take learning into their own hands, realizing that communicating science is a skill that they will need throughout life to succeed. My Communicating Science course incorporates: learning of core science knowledge through lectures, research teams, and peer teaching; development of critical thinking through analysis of sources; and practice with simulations, games, and pair-share activities. We cover four highly miscommunicated topics: Infection, Immunology & Vaccines; Genetics & GMO’s; Climate Science & Global Warming; and Harm Reduction & Drugs. Since practice is key, we employ the flipped classroom method nearly every class. Students are required to learn content on their own time. Class time is spent discussing content and practicing to a variety of scientific and non-scientific audiences.
During this session, we will explore both a successful and unsuccessful flipped classroom session, lessons learned, and how to teach science communication.

**ASM Curriculum Guideline Concept(s):** Impact of microorganisms, Advancing STEM education and research

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**MICROBREW B: 11:50 AM – 12:05 PM**

**Mining the Immune Epitope Database to Investigate Cross-Reactive Epitopes between Zika Virus and Myelin Basic Protein**

**Huda Makhluf, National University, La Jolla, CA.**

**Tower Court A**

Zika virus infections are triggers for Guillain–Barré syndrome (GBS), an autoimmune disease characterized by neurological deficits. In a pre-nursing microbiology class, students were instructed to analyze regions of homology between the Zika strain MR-766 polyprotein and the human Myelin Basic Protein known to be affected in GBS. Students tested the hypothesis that there are cross-reactive epitopes between the Zika polyprotein and MBP causing mimicry and a surge in autoimmune reactive cells. Using NCBI-BLAST, students detected three similar amino acid regions ranging from 28% to 58% in identity between MBP and Zika polyprotein. Students then mined the immune epitope database (IEDB) for MBP autoimmune epitopes, and verified that the identified cross-reactive epitope was part of a biocurated autoimmune epitope in MBP albeit in multiple sclerosis. This Microbrew session will address the innovative use of the IEDB in investigating current and relevant research questions in the classroom and the assessment rubrics deployed. Additionally, it will address the paramount role the instructor could play in intentionally designing engaging assignments that demand rigor and critical thinking.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research, Microbiology laboratory skills

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**Math of Microbiology: An Approach to Increase Math Skills in Undergraduate Science Majors**

**Jason C. Baker, Missouri Western State University, St. Joseph, MO.**

**Tower Court B**

Mathematics is an integral part of many science-based careers yet a large percent of life science undergraduates (Biology, Biochemistry and Molecular Biology, Medical Technology, Natural Science, Biotechnology, etc) at Missouri Western State University lack confidence in mathematics. Several interactions with regional life science industries reinforced the need to teach math skills in the undergraduate science curriculum. In an effort to meet the goals of increasing math skills relevant to science careers I have implemented a systematic integration of basic algebra, units and unit conversions, and math problem solving into the microbiology course taken by science majors. Students must master calculations related to microbial cell enumeration, growth rate, thermal death rate, solution preparation, concentrations, and dilutions. Integrated into this are the skills of unit conversions, magnitudes, estimating, correct use of calculators, and scientific notation. Interactive math activities are integrated into lectures, labs, a graded lab report, a graded math worksheet, and ultimately a math skills quiz as part of the course's final exam. On an initial pre-test/post-test assessment, students increase their average success from 34% correct to 73.1% correct for these math skills. This approach to teaching mathematics in a science-majors microbiology course can help students achieve increased mathematics skills relevant to science careers.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research, Microbiology laboratory skills
An Active Learning Approach to Reading the Primary Literature: Designing and Implementing a Bacteria and Bacterial Infections Online Course Using a “Pet Pathogen”

Elise M. Mosser, Ph.D., Mariana E. Bernui, Ph.D., Krys Adkins, M.Ed., Frances Sun, Brian Wigdahl, Ph.D., and Sandra Urdaneta-Hartmann, M.D., Ph.D., M.B.A., Drexel University College of Medicine, Philadelphia, PA.

In the process of converting existing face-to-face curriculum to a fully online format we were faced with the need to develop creative interactive ways to teach a bacteriology course in an asynchronous format that would be engaging, while at the same time keeping the expected level of rigor and quality. To meet this goal, we designed a student-driven approach to reading, writing, and applying primary literature; a key component to any traditional, blended, or online upper division microbiology undergraduate or graduate course. Our approach was to assign students a bacterial “pet pathogen” at the beginning of the semester. Students serve as the class expert for that bacterium for the entire semester by sharing their knowledge through a blog. In short, students use primary literature to blog about their pet, while at the same time, comparing their pet to others in the class by generating their own discussion questions for their peers. Finally, as summative assessments, students write a mini-review based on their blog posts, and create a mock podcast at the end of the semester, highlighting breaking research. Thus, students are given the opportunity to synthesize their blog posts into a cohesive paper, as well as practice their oral communication skills and learn to use digital communication technologies. Not only do these activities require students to apply bacterial pathogenesis concepts to a specific bacterial pathogen, but they also develop critical thinking skills. Students learn to ask scientific questions, develop written and oral communication skills, while also creating significant student to student and student to instructor interaction. In this session, in addition to explaining implementation of this learning activity in a graduate-level course, we are seeking advise on how to best adapt this course as an upper division microbiology undergraduate online course.

ASM Curriculum Guideline Concept(s): Structure and function, Impact of microorganisms

Specs Grading: Motivating Students While Simplifying Grading

Jennifer O’Connor, Rose-Hulman Institute of Technology, Terre Haute, IN.

Specifications or “specs” grading is an adaptation of the pass/fail grading system in which students are provided a list of requirements (or specifications) for each graded item during the term. Students must produce quality work that meets every specification to earn a pass for an assignment. Final course grades are based on meeting a specified number of passes in each grade category (as stated in the syllabus). After reading Linda Nilson’s “Specifications Grading: Restoring Rigor, Motivating Students, and Saving Faculty Time” as a part of a book club at my institution, I implemented this grading strategy into my evolution and diversity course because I hoped that this system might enable me to balance providing multiple opportunities for student assessment with a reasonable time spent grading. Because my previous grading rubrics became the specifications for each assignment, I was requiring more quality in work product from the students. My experience with specification grading has been positive: 1) students were more motivated to earn higher grades and spent more time on course assignments, 2) students produced high quality work, 3) students appreciated having control over their work, and 4) grading took less time as student work products were easier to review (no reading first drafts) and I did not waste time discerning the allocation of points. I have since implemented this system in an upper level elective, Cancer Biology, using Nilson’s suggestion of assigning different expectations to given grade levels with the higher grades requiring the production of more and better work products.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research

Developing Interrupted Case Studies to Increase Student Interactions with Real Data and Primary Literature Sources

Michele Culumber, Weber State University, Ogden, UT.

One of my course goals is to increase students’ interactions with real data that supports (or sometimes contradicts) the concepts and ideas they learn in class. However, students often struggle when reading primary literature. They might have limited
experience with the methods the presentation of the results, which makes understanding those results and drawing conclusions very difficult. I use interrupted case studies to lead students through scientific papers, and spend the most time on identifying hypotheses and verbalizing results. Students read excerpts from the text, develop a hypothesis, diagram the methods, and ask questions. Then they are shown figures, without the legends, and asked to answer questions about the results. The example I will present is based on the paper: Williams, C., Neu, H., Gilbreath, J., Michel, S., Zurawski, D., and Merrell, D. 2016. “Copper resistance of the emerging pathogen Acinetobacter baumannii,” Applied and Environmental Microbiology 82:6174. The case focuses on the stages of microbial growth, antimicrobial compounds and resistance, and biofilms. I will also discuss how I aligned and assessed this activity with respect to ASM core concepts.

**ASM Curriculum Guideline Concept(s):** Cell structure and function, Microbiology laboratory skills

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**Effective Methods for Implementation and Evaluation of Game-Based Learning (GBL) for Microbiology Education**

Carla Brown, Vincent Mills, Elise Mosser, Frances Sun, Krys Adkins, Brian Wigdahl, and Sandra Urdaneta-Hartmann, Drexel University, Philadelphia, PA.

**Spruce**

Game-based learning (GBL) is an emerging trend in higher science education and is defined as the use of game(s) to teach a particular skill or to reach a specific learning outcome. Digital GBL uses computer-based technology (PC games or mobile applications) to offer an interactive and enriching experience to learner. A growing body of research shows that digital GBL can indeed be productively used to support science learning in K-12 classrooms. We envisage that we can improve learning outcomes among higher education students by introducing digital games to supplement the curriculum of courses in general microbiology and related disciplines. To this end, our strategy involves development of digital games in-house by an interdisciplinary team comprised of subject matter experts, game developers and e-learning experts. To ensure cohesive learning, the learning objectives of the digital games designed are aligned with those of the courses in which the game(s) will be used. We plan to implement digital GBL as an out of class activity (e.g., in online and hybrid courses) but it could also be implemented as an in-class activity (e.g., face-to-face courses) to supplement learning. Due to the increased uptake of digital devices in college student populations, there is great potential for educational games in science education if effective and sustainable strategies for their integration and evaluation can be realized. Currently, there are limited comprehensive models to guide both the implementation and evaluation of digital educational games. Therefore, the purpose of this session is to discuss effective methodologies for integrating GBL into upper division microbiology coursework. Here, we will discuss strategies for implementing games into taught, hybrid and online courses alongside methods for effective assessment of the learning capacity of these resources (e.g., pre- and post-game play learning assessments).

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research

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**Introducing Troubleshooting to Undergraduate Laboratory Settings Promotes Critical Thinking and Problem-Solving Skills**

Revati Masilamani and Berri Jacque, Tufts University School of Medicine, Boston, MA.

**Denver**

Authentic laboratory experiences have been shown to be extremely valuable in building student competencies in scientific practices and critical thinking. In many undergraduate settings however, budget and resource constraints limit laboratory experiences to cookbook approaches. While easier to run, these labs typically do not lend themselves to inquiry-based problem solving and creative thinking, leaving students feeling anxious and discouraged when experiments fail to yield expected results.

To expose students to critical scientific thinking within an easy-to-run case-based microbiological lab involving clinical diagnostic methods, we incorporated an element of troubleshooting. Once students had conducted their own experiments in the lab case, they were provided with images of unexpected results and asked to interpret the data and suggest solutions. We deconstructed troubleshooting, as it is routinely and intuitively performed by scientists, into a guided multi-step process for students. To this end, our strategy involves development of digital games in-house by an interdisciplinary team comprised of subject matter experts, game developers and e-learning experts. To ensure cohesive learning, the learning objectives of the digital games designed are aligned with those of the courses in which the game(s) will be used. We plan to implement digital GBL as an out of class activity (e.g., in online and hybrid courses) but it could also be implemented as an in-class activity.
Preliminary data suggests that this guided approach significantly improved students’ ability to troubleshoot over time. We saw an increase in accuracy as well as higher order thinking skills through iterative discussions that were collaborative in nature. Attitudinal data suggest that the troubleshooting exercise made them feel more confident and excited with the challenge of dealing with unexpected experimental outcomes. These gains are similar to those reported in students who experience authentic inquiry-based labs.

We believe that incorporating troubleshooting into undergraduate laboratory settings is a powerful, resource-inexpensive way to transform cookbook labs from the emphasis on technical precision to critical reasoning and analysis skills. In this session I will demonstrate some of these troubleshooting activities, and seek feedback on ways to adapt this strategy to diverse laboratory settings.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research, Microbiology laboratory skills

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**MICROBREW C: 12:10 PM – 12:25 PM**

**Infectious Disease Outbreak and Herd Immunity Simulation – With a Visual Appeal**

Johanna Schwingel, St. Bonaventure University, Allegany, NY.

**Tower Court A**

A visual, interactive simulation was developed to engage students and increase their understanding of infectious disease spread through an immunized population. Herd immunity, one of the many benefits of vaccination, can be a difficult, abstract concept to portray. While pictures and diagrams are useful in illustrating a barrier of immunized individuals surrounding an infected person, a real-life, visual, and interactive scenario is preferable. In this two phased simulation, students model disease progression and immunization effectiveness. The first phase employs a commonly used infectious disease/outbreak scenario (the distribution of an alkaline solution followed by pH indicator detection) to observe disease spread through a susceptible population. After the first phase, most students should be “infected” by the disease as evidenced by a change in the pH indicator color. The second phase follows the same process as the first; however, a portion of the population is now vaccinated/immune (via a buffered solution). After the second phase, few students should be infected as they were not able to become sick due to their immune status or serve as carriers to spread the disease. A comparison of infected individuals after each phase indicates any individuals protected by herd immunity.

This simulation provides a visual representation of infectious disease spread and protection resulting from vaccination or past exposure to the infectious agent. The simulation has been used with middle school students, undergraduates (both majors and non-majors), and adults. The data analysis and discussion of the results can be scaled to the audience easily. The discussed infectious disease scenarios and accompanying simulation should deepen student understanding of immune protection and herd immunity benefits.

**ASM Curriculum Guideline Concept(s):** Microbial systems, Advancing STEM education and research

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**An Interdisciplinary Laboratory Experience for Microbiology and Physics Students**

Matthew Domek, Weber State University, Ogden, UT.

**Tower Court B**

Students from a microbial physiology laboratory course and a physics material characterization laboratory course worked together over a two-week period in an interdisciplinary laboratory experience. Students in the upper division microbiology course are skilled in microscopy and can readily perform Gram stains and wet mounts under bright field microscopy. Physics students, in their laboratory course, have gained expertise in environmental scanning electron microscopy (ESEM) and the use of the atomic force microscope (AFM). Microbiology students rarely get the opportunity to work an ESEM or AFM in a teaching laboratory, while physics students rarely work with biological specimens. In this laboratory experience, physics students were paired with microbiology lab groups during the first lab period. Microbiology students prepared Gram stains and phase contrast images of motile bacteria. They also prepared bacteria for ESEM and AFM using simple fixing methods such as ethanol dehydration and phosphotungstic acid. In the second period, the physics student performed AFM or ESEM with the microbiology lab group. Students from both courses worked together and provided each group an opportunity to appreciate the collaborative nature of scientific research. The interdisciplinary laboratory
experience yielded a number of positive outcomes: all students gained a greater understanding of microscopy, new collaborations developed between departments which included undergraduate research opportunities and a discussion of assessment techniques and tools used by each department.

ASM Curriculum Guideline Concept(s): Structure and function, Advancing STEM education and research

**Stressing Escherichia coli to Educate Students about Research: A CURE to Investigate Multiple Levels of Gene Regulation**

Celeste N. Peterson (1), Vanja Klepac-Ceraj (2), Agilai Papaj (1), Ashley Maceli (1), Lara K. Goudsouzian (3), and Janet McDonough (2), (1) Suffolk University, Boston, MA, (2) Wellesley College, Wellesley, MA, (3) DeSales University, Center Valley, PA.

**Tower Court C**

Course-based undergraduate research experiences (CUREs) have been shown to help students learn analytical and technical skills while giving them a sense of ownership. Most biology CURES focus on the central dogma of biology or one type of regulation of gene expression. However, there are few CURES that demonstrate different types of gene regulation as well as the discovery process of finding new regulatory factors. Here we describe a readily accessible laboratory module whereby students carry out a forward genetic screen to identify regulators of the stationary phase master regulator RpoS in the model organism Escherichia coli and then use a series of reporter fusions to determine if the regulation is at the level of transcription or the post-transcription level. This laboratory module has been run both as a 9-week long project and a condensed 5-6 week version in three different schools and types of courses. A majority of the genes found in the screen are novel, thus giving students the opportunity to contribute to original findings to the field. Pre and post assessments of this CURE show student gains in learning how to describe the central dogma of biology, analyze data to examine gene regulation at multiple levels and recognize common molecular tools used in forward genetic screens. In addition, attitudinal surveys suggest the students are enthusiastic about the screen and their learning about gene regulation. In summary, this lab would be an appropriate addition to an intermediate or advanced level Microbiology or Molecular Biology curriculum.

ASM Curriculum Guideline Concept(s): Information flow and genetics, Microbiology laboratory skills

**Decreasing the Barrier Imposed on Learning by Multiple-Choice Exams**

Timothy Paustian, University of Wisconsin–Madison, Madison, WI.

**Tower Court D**

“But professor, I don't do well on multiple-choice exams!” How often have you heard that response? Many students have difficulty demonstrating their mastery of a subject when the summative assessment is a multiple-choice exam. My hypothesis is that they do not spend enough time practicing the task they will be required to do, careful reading of multiple-choice questions and then retrieval of learned information to answer them. In previous semesters, I have informally encouraged students to write questions and practice answering them as a group activity. For those students who did, their grades improved. However, when I looked at the questions that they wrote, almost all were lower order recall of information. In addition, most students did not participate. To attack this problem more formally, I developed a web application, the exam question database (EQD). In this activity, the class of 222 students was given all the learning outcomes for the upcoming exam. They were coached on how to write effective multiple-choice questions and then challenged to write a question to an assigned learning outcome. In the EQD, they wrote a stem, five choices, and an explanation of the correct answer. All submissions were reviewed for clarity and correctness. About 200 questions were created for each exam. The EQD also allowed them to create practice exams. Once finished with a practice exam, it was automatically graded; showing them their responses, the correct answers, and explanations. Students found the explanations most helpful for learning the material. The exams contained about 40% questions from the EQD and 60% original material. The use of the exam question database improved performance on the exams by 10% in comparison to previous semesters. In this microbrew, I will describe the process, have individuals participate in it, and offer tips for making this successful in your classroom.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Adaptation of Small-Group Case Studies for Use in Larger (>75 Students) Classroom Settings

Michaela Gazdik Stofer, Utah Valley University, Orem, UT.

Silver

Case-based teaching uses stories either based-on, or designed to be similar to, real-life problems. Case studies present content in the form of a narrative with the goal of not only teaching the content of the subject, but also the process of science. Evidence from the literature indicates that incorporating case studies as a pedagogical tool improves students’ exam performance, motivation, confidence, and critical thinking and problem solving abilities. Case studies have been increasingly used in science education due to their highly adaptable methodology. There are four main classifications of cases: individual, lecture, discussion, and small-group activities based on who is doing the case analysis. Studies have shown that working in groups during completion of case studies significantly improves student perceptions of learning and may increase performance on assessment questions. However, in larger class settings individual and lecture based case studies, often with the use of clicker-based cases, are more common due to difficulties of managing and grading case studies with a large number of students. In this microbrew session I will discuss two different methodologies I have utilized to teach small-group cases in mid-size (~75 student) general biology and introductory microbiology courses. The session will provide the methods used to conduct and assess student learning for two separate cases, while discussing the benefits and disadvantages of each.

ASM Curriculum Guideline Concept(s): Metabolic pathways, Impact of microorganisms

The Meselson-Stahl Experiment: An Activity Using Models for DNA Replication to Predict Experimental Results

Nickie Cauthen, Melinda Pomeroy-Black, LaGrange College, LaGrange, GA.

Spruce

In teaching introductory genetics, most textbooks highlight the experiments that led to the discovery that DNA is the genetic material as well as the Meselson-Stahl experiment that showed that DNA is replicated using a semi-conservative mechanism. These experiments are important, but textbooks typically give students the information rather than allow them to review the experimental design and predict results from the models. To develop analytical skills, an activity based on the Meselson-Stahl experiment is used to evaluate three models for DNA replication (conservative, semi-conservative, and dispersive). In class, a mini-lecture is given to introduce the models for DNA replication, principles that underlie the Meselson-Stahl experiment, and the experimental design. In this activity students work through the models for DNA replication to apply the principles of the Meselson-Stahl experiment and determine the data that each model would generate in the experiment after 1, 2, and 3 rounds of replication. The students then discuss their model-based predictions and work through any errors in logic. Finally, students compare their predictions with the data that was reported by Meselson and Stahl to select the biologically relevant mechanism for DNA replication. This exercise allows students to apply the sometimes-abstract concept of models to an experiment and use knowledge and critical thinking to determine the relevance of a model based on data.

ASM Curriculum Guideline Concept(s): Information flow and genetics, Microbiology laboratory skills

Use of a Reading/Writing Assignment Based on Popular Literature to Engage Students in Introductory Microbiology

Tracy O’Connor and Ana Colina, Mount Royal University, Calgary, AB, Canada.

Denver

Student learning is aided by personal engagement by the students with the subject matter. Research paper assignments are a traditional way of encouraging students to engage with a topic. However, junior students often struggle when writing research papers, producing work that fails to demonstrate understanding or coherence. Another way of engaging students is through narrative. For microbiology students, relevant narratives are available in the form of popular non-fiction books that tell the stories of important infectious disease outbreaks, the pathogens that cause them, and human attempts to control them. A combined reading/writing assignment was developed to engage introductory microbiology students in the subject and to help them improve their writing skills. Near the beginning of the semester, students choose a book to read from a selection provided by the professor. Shortly thereafter, students are required to
complete a short open-book quiz on their book of choice, and to submit two or more questions related to the book that they might research for a brief written report. The professor provides feedback to each student to help them come up with a suitably focused question. Similarly, students are provided with feedback after the sequential submission of their annotated bibliography, outline, and rough draft. The final paper and the preceding submissions are graded according to a rubric that the students are given at the beginning of the semester, which is quite stringent regarding the final product but rewards effort throughout the early stages. Surveys administered at the end of the semester indicate that most students find the assignment both enjoyable and informative. Furthermore, most students taking the subsequent microbiology course a year later indicate that the reading/writing assignment they completed in the first course had been useful for their learning.

**ASM Curriculum Guideline Concept(s):** Impact of microorganisms, Advancing STEM education and research

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**LUNCH**
12:30 PM – 1:30 PM
South Convention Lobby

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**FOCUS GROUP – BY INVITATION ONLY**
12:45 PM – 1:15 PM
Colorado
Sponsored by Pearson

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**POSTER SESSION B**
1:30 PM – 2:30 PM
Grand Ballroom II

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**2-B**
Student Attitudes toward Biology in an Introductory Biology Course at a Two-Year, Open-Access College
Amy Beumer, University of Cincinnati, Blue Ash College

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research
**Pedagogical Category(ies):** Student learning

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**4-B**
A Discovery-Based Summer Research Laboratory for High School Students in the Genetics of Aging
Christopher Burtner, Harvard Medical School

**ASM Curriculum Guideline Concept(s):**
Advancing STEM education and research

**Pedagogical Category(ies):** Hands-on projects

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**6-B**
Preliminary Assessment of a Microbial Ecology Research Capstone for Gains in STEM Skills and Attitudes
Pratima Darr, Georgia Gwinnett College

**ASM Curriculum Guideline Concept(s):**
Advancing STEM education and research

**Pedagogical Category(ies):** Course design, Student learning

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**8-B**
WITHDRAWN

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**10-B**
Mix of the Old and the New: Identification of Bacteria
Jeanetta Floyd*, Georgia State University
*To be presented by: Robert Maxwell, Georgia State University

**ASM Curriculum Guideline Concept(s):**
Impact of microorganisms, Advancing STEM education and research

**Pedagogical Category(ies):** Hands-on projects

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**12-B**
Student-Driven Independent Research Investigations in an Introductory Majors Microbiology Laboratory Course
Brinda Govindan, San Francisco State University

**ASM Curriculum Guideline Concept(s):**
Impact of microorganisms, Advancing STEM education and research

**Pedagogical Category(ies):** Hands-on projects
14-B
Trials and Tribulations: Implementation of Effective and Productive Course-Embedded Research Projects in Undergraduate Laboratories
John E. Gustafson, Oklahoma State University
ASM Curriculum Guideline Concept(s): Structure and function, Advancing STEM education and research
Pedagogical Category(ies): Course design, Hands-on projects, Teaching approaches

16-B
Assessment of a Model-Based Riboswitch Activity for Instruction on Microbial Gene Regulation
Adam Kleinschmit, Adams State University
ASM Curriculum Guideline Concept(s): Structure and function, Information flow
Pedagogical Category(ies): Teaching tools

18-B
Interactive Teaching Strategies for a Combined Lecture and Lab Microbiology Course
Mustafa Mujtaba, Florida Gulf Coast University
ASM Curriculum Guideline Concept(s): Information flow, Advancing STEM education and research
Pedagogical Category(ies): Student learning, Teaching tools

20-B
Excellent Result Achieved among Biomedical Students when Projected Slides and Videos Were Supplemented with Traditional Method of Teaching Practical
Adeolu Oluwem, Ladoke Akintola University of Technology
ASM Curriculum Guideline Concept(s): Information flow, Advancing STEM education and research
Pedagogical Category(ies): Student learning, Teaching approaches, Teaching tools

22-B
Analyzing the Effects of Formative Assessment in Promoting Transfer of Learning in an Undergraduate General Microbiology Course
Andrea Rediske, University of Central Florida
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning

24-B
Helping Students Write about Data: A Simple Teaching Intervention to Support Quantitative Writing
Tracy Rusceti, Santa Clara University
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning, Teaching approaches, Teaching tools

26-B
A Science and Journalism Collaboration to Enhance Scientific Communication
Johanna Schwingel, St. Bonaventure University
ASM Curriculum Guideline Concept(s): Impact of microorganisms, Advancing STEM education and research
Pedagogical Category(ies): Hands-on projects, Student learning

28-B
Students’ Knowledge and Perceptions of Learning in a Co-Taught Astrobiology Course
Jason Tor, Hampshire College
ASM Curriculum Guideline Concept(s): Advancing STEM education and research
Pedagogical Category(ies): Student learning, Teaching approaches
PRODUCT CORNER
1:30 PM – 2:00 PM
Gold
Sponsored by miniPCR
Presenter: Alia Qatarneh

Come to our product corner to see what the next generation biotech lab for your classroom looks like. The DNA Discovery System™ includes a miniPCR™ thermal cycler, blueGel™ electrophoresis with transilluminator, and a micropipette that all fit in a small bag. Start teaching about DNA in a way all students get an exciting hands-on experience! You will be using the same equipment that is combating Ebola in Sierra Leone and enabling genomics research aboard the International Space Station!

PRODUCT CORNER
1:30 PM – 2:00 PM
Century
Sponsored by McGraw-Hill Education
Presenter: Denise Anderson

Teaching Positive Skepticism

Explore methods to help students develop a healthy sense of positive skepticism, while simultaneously engaging them during class and allowing them to apply their budding microbiology knowledge. Methods discussed will include showing topic-relevant statements—some accurate and others misleading—from news and blog articles, and using carefully crafted audience response system (“clicker”) questions.

AUTHOR CORNER
1:30 PM – 2:00 PM
W. W. Norton Exhibit Booth – Grand Ballroom II
Sponsored by W. W. Norton
Featured Author: Zarrintaj Aliabadi

Using Case Histories to Overcome Teaching Challenges in Microbiology

Coauthor Zarrintaj Aliabadi will discuss the challenges of teaching microbiology for allied health students and techniques that she uses to address these challenges. Using an example from the text, she will show how the case history approach in Microbiology: The Human Experience not only engages students as they learn key concepts, but also makes teaching fun for instructors.

AUTHOR CORNER
1:30 PM – 2:00 PM
Colorado
Sponsored by Pearson
Featured Author: Lourdes Norman-McKay

Lourdes Norman-McKay is a Professor of Microbiology and Anatomy & Physiology at Florida State College Jacksonville. In addition to fifteen years of teaching allied health studies, Dr. Norman-McKay also has experience as an academic dean over STEM programs. In 2016, she received the outstanding faculty award at Florida State College Jacksonville. Dr. Norman-McKay is also an active participant on the ASM Microbiology in Nursing Task Committee. In this interview-style session, you will hear about her inspiration and approach to writing a new allied health-focused microbiology textbook to be published by Pearson.

SCAVENGER HUNT RAFFLE PRIZE DRAWING
2:15 PM – 2:30 PM
Grand Ballroom II
Attend the Annual Biomedical Research Conference for Minority Students (ABRCMS)

NOVEMBER 1-4, 2017 IN PHOENIX, AZ

At ABRCMS 2017, over 650 exhibitors will showcase summer program and graduate school opportunities to aspiring scientists pursuing advanced training in science, technology, engineering and mathematics toward graduate-level study.

Join over 2,300 students and 1,100 researchers from graduate programs, colleges and universities to network, learn and share research.

Submit your abstract in 12 disciplines in biomedical and behavioral sciences.

IMPORTANT DATES:

- Student Travel Award deadline: August 25, 2017
- Abstract submission deadline: September 8, 2017

ABRCMS 2017, where we close the gap and develop the next generation of STEM scientists.

www.abrcms.org/joinus
### MICROBREW SESSION II OF III
**SATURDAY, JULY 28**

#### ROOM LOCATION

<table>
<thead>
<tr>
<th>Tower Court A</th>
<th>Tower Court B</th>
<th>Tower Court C</th>
<th>Tower Court D</th>
<th>Silver</th>
<th>Spruce</th>
<th>Denver</th>
</tr>
</thead>
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**MICROBREW D: 2:30 PM – 2:45 PM**

- **Implementation of a Learning Assistant Program in an Introductory Biology Course for Pre-Nursing Students in a Small Liberal Arts College – Will it Help Underrepresented Students Succeed?**
  - Vicki Isola, Hope College

- **The Flipped Classroom in Veterinary Pre-Clinical Sciences: Student Engagement, Performance and Satisfaction**
  - Krys Adkins, Drexel University College of Medicine

- **Using Role Play to Enhance Student Comprehension of Cellular Respiration**
  - Katherine Marsh, El Camino College Compton Center

- **Comparing Apples and Oranges: An In-Class Activity to Help Students Appreciate the Diversity of Bacteria and the Gram Stain**
  - J. Jordan Steel, Colorado State University, Pueblo

- **Peanut Butter Protocols: Incorporating a Favorite Snack to Improve Communication**
  - Olivia Long, University of Pittsburgh at Greensburg

- **Engaging Students in Real-World Applications and Research Projects**
  - Sharon Gusky, Northwestern Connecticut Community College

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**MICROBREW E: 2:50 PM – 3:05 PM**

- **Bite-Sized Mentoring For Bite-Sized Research: Creating Undergraduate/High School Partnerships for a Short, Course-Based Authentic Research Module**
  - Elizabeth Genné-Bacon, Tufts University School of Medicine

- **Cultivating Perseverance Through Study Plans**
  - Robert Maxwell, Georgia State University

- **Turn on Your Electronic Devices: Embracing Technology to Improve Student Engagement during Active Learning!**
  - Samantha Parks, Georgia State University

- **It's All Fun and Games in Immunology??!!**
  - Shannon McQuaig-Ulrich, St. Petersburg College

- **Microbes in the News: Using Popular News to Explore Microbes and Their Intersection with the World**
  - Alexandra Walczak, Rutgers, The State University of New Jersey

- **The Science of Pickles: A Discovery-Based Microbiology Lab Redesign**
  - Alice Lee, North Carolina State University

- **How to Create a Superbug: New Laboratory Modules to Expand upon a Course-Based Research Experience**
  - Jennifer Larson, Capital University

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**MICROBREW F: 3:10 PM – 3:25 PM**

- **Student-Driven Independent Research Investigations in an Introductory Majors’ Microbiology Laboratory Course**
  - Brinda Govindan, San Francisco State University

- **Lessons Learned from Organizing and Evaluating an Undergraduate Research Symposium**
  - Emily Nowicki, The University of Texas at Austin

- **Winogradsky’s Battery: Visualizing Electron Potential in a Sediment Column**
  - Craig Phelps, Rutgers, The State University of New Jersey

- **Microbiology Pictionary: An Engaging and Competitive Classroom Activity to Review Course Material**
  - Kara Mosovsky, Moravian College

- **Game Based Learning: Boardgames That Teach Biological Concepts**
  - Jamie Cunningham, Johnson County Community College

- **Using Hops to Implement Intercampus and Interdisciplinary Collaborative Research Projects for Undergraduates**
  - Kristen Swithers, Southern Connecticut State University

- **Antimicrobial Effectiveness of Holistic Oils**
  - Kenzi Brooks, Seminole State College of Florida
MICROBREW SESSIONS (II OF III)
2:30 PM – 3:25 PM
(7 Sessions)

These grassroots sessions, arranged by topics, provide a forum for sharing best practices and interesting activities used in laboratory and classroom teaching. Presentations are simple “chalk talks” (e.g., no PowerPoint) to facilitate informal discussion. Unlike the poster sessions, Microbrews do not require assessments. Sessions will be facilitated by volunteer attendees in order to make certain each presentation stays within the 15-minute presentation (10-minute presentation and 5 minutes for discussion). Sessions must stay on time so attendees are able to move from room to room quickly to see their desired session.

Session Room Facilitators:

Tower Court A
Facilitator: Carolyn Allen, Palm Beach State College

Tower Court B
Facilitator: Linda Young, Ohio Northern University

Tower Court C
Facilitator: Brittany Gasper-Warrick, Florida Southern College

Tower Court D
Facilitator: Melissa Zwick, Florida Southern College

Silver
Facilitator: Caroline Kulesza, Fort Lewis College

Spruce
Facilitator: Samantha T. Parks, Georgia State University

Denver
Facilitator: John Buchner, University of Maryland

MICROBREW D: 2:30 PM – 2:45 PM

Implementation of a Learning Assistant Program in an Introductory Biology Course for Pre-Nursing Students in a Small Liberal Arts College – Will it Help Underrepresented Students Succeed?

Vicki Isola, Hope College, Holland, MI.

Tower Court A

Hope College is a small liberal arts college (~3,300 students). Biology 103 is a first-year fall semester class required for all pre-nursing students. The class typically contains 80-90 students, 80% are pursuing nursing and about 15% considered underrepresented. Biology 103 covers basic topics related to cell biology and genetics, with an emphasis on application to human health and disease. The class consists of three one-hour lectures and one three-hour lab each week. I am the only professor at Hope currently using the UC Boulder Learning Assistant (LA) model, and therefore I run the program myself and the LAs get paid from our department’s teaching assistant budget. In the spring I invite the top students from the previous fall’s Biology 103 class to apply to be an LA. I have two lecture sections of 40-50 students each with two LAs assigned to each lecture. The LAs attend every lecture, keep track of what happened in class that day, and circulate throughout the class answering student questions and leading the students through the problems during activities. In addition, each LA runs two 1-hour study groups one night each week. I meet with the LAs for one hour each week during which we talk about how their study groups are going, discuss relevant pedagogy, review that week’s material, and practice study group activities. During the first week of classes, all students sign up for a study group time, and the LAs are given their names to keep track of attendance. Most students attend at least one session each week and some attend more than one. After three years of the LA program, in general, the students with higher study group attendance achieve a higher average exam grade. As a group, however, underrepresented students tend to have the lowest participation.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research

Formative Assessment for Online and Hybrid Classrooms

Krys Adkins, Drexel University College of Medicine, Philadelphia, PA.

Tower Court B

Whether you are teaching a traditional microbiology course, or one that is online or hybrid, formative assessments can help you gauge students’ progress toward achieving learning objectives. Classroom Assessment Techniques (CATs) are informal, low stakes learning activities that provide periodic feedback (formative assessment) to improve teaching and learning. CATs are usually paper-based activities that are completed by individual or small groups of students during a traditional class. However, CATs can also be successfully used in an online environment, although implementation can be a bit more challenging.
In this microbrew session, you will learn (1) the purpose of formative assessment in teaching and learning, and (2) several proven online formative assessment activities you can use to periodically get actionable feedback on student learning and teaching effectiveness.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research

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**The Flipped Classroom in Veterinary Pre-Clinical Sciences: Student Engagement, Performance and Satisfaction**

**Dr. Sarah Frankland, Dr. Laura M. Dooley, Dr. Elise Boller, Associate Professor Elizabeth Tudor, The University of Melbourne, Parkville, Victoria, Australia.**

**Tower Court C**

There has been a recent move toward active learning pedagogies in tertiary education, with increasing use of a blended approach that incorporates both online resources and live classroom sessions. This talk will discuss the transition of an established veterinary pre-clinical course from a traditional didactic lecture delivery mode to a ‘flipped classroom’ approach with core content delivered online. The experiences of two cohorts of students who studied the course in consecutive years and experienced the different delivery modes will be compared. In this example learning resources delivered online included short video segments and a variety of short problems and activities. Online materials were complemented with weekly small group case-based learning classes facilitated by academic staff. The effects of this were compared by a mixed methods evaluation strategy using student grades, surveys and focus groups to compare student academic performance, satisfaction and engagement in the two cohorts. The outcomes and implications of transitioning from a traditional to a flipped classroom will also be discussed and the flipped classroom will be presented through our online Learning Management System (if technology is available to do so.)

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research

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**Using Role Play to Enhance Student Comprehension of Cellular Respiration**

**Katherine A. Marsh (1) and Aaron M. Ambrus (2), (1) El Camino College Compton Center, Compton, CA, (2) University of California, Los Angeles, Los Angeles, CA.**

**Tower Court D**

The process of cellular respiration is a topic that is widely taught in biology and microbiology courses, yet it is notoriously difficult for students to comprehend due to its complexity. A solid understanding of how this complicated process works is foundational to understanding the core concept of metabolism. When students misunderstand even one aspect of the multistep process, their overall comprehension of how all of the parts work together to generate ATP is lacking. I teach a mid-sized introductory biology course geared towards non-biology majors at a community college and my students especially benefit from engaging in active learning activities.

Hence, I have developed a role-playing activity of cellular respiration which focuses primarily on oxidative phosphorylation, the most complicated stage in the process. Students are assigned to play the roles of the factors involved (e.g., ATP synthase, cytochrome c) and receive scripts that dictate what the actors should say and do. The students then role play several different scenes representing either the normal process or what happens when the process is disrupted (e.g., cyanide poisoning, no oxygen available). Through this kinesthetic learning activity, students experience how oxidative phosphorylation works and they realize exactly why perturbations to the electron transport chain inhibit ATP production, thus reinforcing their comprehension of how the entire process works. Students reported that they learned the material better through role playing than through listening to the lecture. In this Microbrew session, I will introduce role playing as an effective active learning tool and discuss the role-playing activity of cellular respiration as an example.

**ASM Curriculum Guideline Concept(s):** Metabolic pathways, Advancing STEM education and research
Comparing Apples and Oranges: An In-Class Activity to Help Students Appreciate the Diversity of Bacteria and the Gram Stain

J. Jordan Steel, Colorado State University–Pueblo, Pueblo, CO.

Silver

Bacteria represent the most abundant living organisms on earth with incredible diversity and variation between species. Comprehension of bacteria evolution, structure/function, taxonomical classification, and microbial impact on life are dependent on understanding bacterial complexity and differentiation. Students tend to struggle appreciating the diversity of bacterial life and often think of bacteria as all being the same. The objective of this activity is to get students critically thinking and discussing differences between bacteria and analyzing the potential implications of those differences. Students work in small groups and initially compare and contrast various types of fruits (apples and oranges) and write out a list of similarities and differences. The groups are then asked to compare and contrast Gram positive and Gram negative bacteria and make a similar list to the fruit. The groups and class discuss the potential benefits or risks associated with the differences between bacterial species and classifications. A direct comparison is made between the thickness of the peel/skin of a fruit with the thickness of a cell wall surrounding the bacteria. How does the thickness of this outer layer affect the fruit? What about the bacteria? This short 10 minute activity can be used in a lecture or a lab course to help students grasp bacterial diversity and help students critically think about the variation within the bacteria domain of life.

ASM Curriculum Guideline Concept(s): Cell structure and function

Peanut Butter Protocols: Incorporating a Favorite Snack to Improve Communication*

Olivia Long, University of Pittsburgh at Greensburg, Greensburg, PA.

Spruce

*Note: Please do NOT attend if you have a peanut allergy, as peanut butter will be present.

Communication in science is critical to the progress and success of our students in their classes, and strong communication skills are highly desired in graduate school and the workforce. Yet, often our students aren’t trained in the skills required to do this effectively. Additionally, “lack of communication” is cited as one of the biggest challenges in the workplace. Why is it so hard to convey information effectively? Frequently in our (or our students) minds we give good directions and yet often failure in the lab can be contributed to a lack of communication.

I have created a simple, low-cost, fun, and engaging way to demonstrate the challenges of effective communication in the lab. In this session, I will share the hands on activity of making a peanut butter and jelly sandwich, lab style. Attendees will perform the activity and discuss implementation in their own labs as well as extensions that can be made.

Feedback from participating students has been overwhelmingly positive. 100% of students felt that I should repeat this activity in future years. Written student feedback included: “relatable everyday activity to demonstrate good protocol techniques”, “taught me how to be clearer and more concise in my communication”, and “after I stopped laughing, I realized this showed me the importance of both spoken and written communication in the lab”. Generally, the students felt that it has helped them to understand how to be more detailed in creating effective protocols, what information to include in their lab notebooks, and improving interactions with their lab partners. Additionally, they thought it was fun and energizing way to start the semester.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research

Engaging Students in Real-world Applications and Research Projects

Sharon B. Gusky, Northwestern Connecticut Community College, Winsted, CT.

Denver

I teach a mixed majors microbiology course to sophomore level students at a community college. Students in this course are environmental science majors, biology majors, or in the Vet Tech or Nursing Program. I have redesigned the microbiology laboratory course so that it exposes students to real-world applications and authentic research through a series of projects rather than discrete laboratory exercises. Students participate in four projects throughout the semester. They use a CDC case study on Food Poisoning to learn about aseptic technique and staining procedures, they then take on the roles of laboratory
technicians in medical microbiology and serology labs, and end the semester by participating in The Prevalence of Antibiotic-Resistance in the Environment (PARE) project. These projects help students understand the impact of microorganisms while introducing a variety of laboratory skills and competencies. Since each project builds on the skills they have previously learned and introduces them to new skills and techniques, I am able to introduce a skill or competency and then give the students the opportunity to practice using it throughout the semester. In addition to learning skills, students also learn how to present their findings in a variety of formats starting with answering guided questions and moving to writing a formal lab report, an informal letter to a patient, and ending with a scientific poster. During my 15 minute presentation, I will talk about how I organize the course, the impact of moving from exercise-based to project-based labs and the skills and competencies that students are exposed to through each project. I will provide a handout that outlines each project and shows how they align with the ASM competencies and skills. I will also provide links to the external resources that I use. The three pedagogical terms used are Real-world, Research and Project-based.

**ASM Curriculum Guideline Concept(s):** Impact of microorganisms, Microbiology laboratory skills

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**MICROBREW E: 2:50 PM – 3:05 PM**

**Bite-Sized Mentoring For Bite-Sized Research: Creating Undergraduate/High School Partnerships for a Short, Course-Based Authentic Research Module**

Elizabeth Genné-Bacon and Carol Bascom-Slack, Tufts University School of Medicine, Boston, MA.

**Tower Court A**

Many studies have demonstrated the positive impact of both mentoring and early research experiences on retention of students in STEM fields. The Prevalence of Antibiotic Resistance in the Environment (PARE) project is a short-duration, course-based research module that is easy to integrate into lab-based courses. By collecting data for a national research effort studying antibiotic resistance in soil, participating students get a “bite-sized” taste of authentic research and a chance to feel like a real scientist. Attitudinal survey data show that the PARE project experience helps students make gains in several key areas. To make research experiences available to younger students, the PARE project builds undergraduate-high school (UG-HS) class partnerships into its course structure. These partnerships expand access to research infrastructure for high school classrooms and foster interaction between high school and college students, creating the opportunity for near-peer mentoring. Near-peer mentoring has emerged as a scalable strategy for increasing access to mentoring relationships, with benefits in retention and success in STEM fields for both mentors and mentees.

Do these “bite-sized” mentoring experiences enhance the benefits of the research experience? The dynamic of the relationships between high schools and undergraduate classes among our participating institutions is variable, ranging from no interaction to directly working together to complete the project. Preliminary data suggest that high school students with more positive mentoring experiences show greater gains, although many logistical concerns for implementation remain. At this session I will report on the structure and findings of the first iteration of our UG-HS mentoring program, and our plans to work with high school and undergraduate instructors to improve the program and co-develop formal PARE mentoring guidelines. I will describe the strategies we have devised for this improved program, and seek feedback on their feasibility from diverse instructor perspectives.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research

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**Cultivating Perseverance through Study Plans**

Robert Maxwell, Georgia State University, Atlanta, GA.

**Tower Court B**

Biological sciences require a different study strategy from other STEM disciplines in that we rarely have problems or drills that students can use to practice the mental skills of the discipline. Being conceptual, we need students to consider, contemplate and reflect as they build mental models of how life works. Beyond reading, this requires that students develop persistent and active study skills. In order to assist students in building effective study skills, study plans were developed to help students cultivate daily study and reflection of biology. The study plans include goals, required readings, optional readings, reflection prompts, relevance prompts, and thought questions. The study plans are augmented by metacognitive surveys related to the student’s confidence level on topics and their study techniques.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research
Turn on Your Electronic Devices: Embracing Technology to Improve Student Engagement during Active Learning!

Samantha Parks, Georgia State University, Atlanta, GA.

Tower Court C

In-class discussions are encouraged, yet can be daunting for students. Students also struggle to balance discussion engagement with effective note-taking and retention of material. In an effort to encourage increased engagement amongst students, a novel method for brainstorming and dissemination of student ideas was developed using Google Slides. Slides is a free app which seamlessly shares across computers and mobile devices.

Initial discussions in an upper-level microbial ecology course felt strained; students were asked to brainstorm in small groups and then shared their group ideas with the class. Students were less engaged, and more focused on note-taking than interacting while other groups were speaking. Additionally, some students would dominate discussions; while one student presented, their group members, and the class at-large, often remained passive. To combat the aforementioned shortcomings, a Slides presentation was constructed. Instructor-designed questions were preloaded as slide titles. When students began group work, they used group-specific colors and added notes from their discussions. Before the large class discussion, groups were instructed to read each other’s notes and prepare to discuss their ideas as well as those from other groups.

The initial application of Slides was extremely well received. The process allowed for increased student engagement, less note-taking, and therefore more accountability of all students during discussions. Several unforeseen benefits emerged, including the ability of students to review such material while studying. Absent students could view in-class discussions, and were able to participate remotely. Furthermore, a documented record of in-class discussions and student ideas was saved and readily accessible for professional development purposes.

This microbrew will include a review of how Slides has been implemented, including book discussions, literature reviews and brainstorming activities across several courses. It will conclude with a peer discussion regarding further applications of Slides in multiple classroom settings.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research

It’s All Fun and Games in Immunology?!?!?

Shannon McQuaig-Ulrich, St. Petersburg College, Clearwater, FL.

Tower Court D

Immunology is a senior-level course in the Baccalaureate Biology program at St. Petersburg College that explores the intricacies of the complex immune system. Students are not only required to use critical thinking skills but they are also required to use brute force memorization of various immune components, many of which are number-letter combinations (e.g. CD-4, IL-2, MHC-2, etc.). In this course, I utilize a series of common games that have been modified to encourage student engagement and retention of information. Examples of the ‘games’ we play include: B-cell Boggle, Complement Bingo, the Cytokine Challenge, along with a few more! In this short session, I will present these games and then initiate a brief discussion on how each faculty member can incorporate these types of activities into their courses.

ASM Curriculum Guideline Concept(s): Microbial systems

Microbes In The News: Using Popular News to Explore Microbes and Their Intersection with the World

Alexandra Walczak, Rutgers, The State University of New Jersey, New Brunswick, NJ.

Silver

The biggest challenge in a teaching lab or classroom can be getting students to see the relevance of the topic to their life. I strive to connect microbiology students with current events that are impacted by microbiological factors. My Microbes in the News assignment has students look for and then summarize popular news articles that have been published in the last three months pertaining to any aspect of microbiology they find interesting. Students must answer a series of questions about the article and relate back the information to what they have learned in class or in the laboratory. This includes determining if the microbe is in the news for a positive or negative reason. Students post the title and a link to their chosen article on a discussion board so other students can see the topics already selected and select a different one as each article can only be
used once. This assignment is currently presented as an extra credit opportunity for students in the lab portion of a general microbiology course but could be easily adapted to a lecture where students would then also discuss their articles in class. This assignment allows students to explore an area of microbiology that might not normally be discussed in class and expose them to the many news worthy aspects of microbiology.

ASM Curriculum Guideline Concept(s): Impact of microorganisms, Microbiology laboratory skills

The Science of Pickles: A Discovery-based Microbiology Lab Redesign
Alice Lee, Jennifer Greenstein, Brian Ford, Andrew Dalrymple, Sandra Gove, Fred Breidt, and Michael Taveirne, North Carolina State University, Raleigh, NC.

Spruce

Introductory Microbiology labs typically teach basic principles of bacteriology using classic protocol-based labs with nominal critical thinking and inquiry-based learning practices. A redesign of our Microbiology labs was undertaken to promote scientific thinking while teaching microbiology concepts and skills. As part of the redesign, a series of discovery-driven labs based on cucumber fermentations were developed. Fermentation is a fundamental microbial process used in making yogurt, cheese, and beer. Principals of food microbiology are not only great topics to learn basic microbiological concepts, but are also relatable topics to students, allowing for engagement in educational exercises. Topics such as food safety, foodborne infections, and public health are all relevant in our highly connected food production chain. In our lab redesign, students will investigate research questions relevant to the cucumber fermentation industry. These labs are developed in collaboration with a USDA/ARS Microbiologist at NC State in the Department of Food Science. In the redesigned labs, students will broadly address how salt concentration affects shifting populations of Enterobacteriaceae and Lactic Acid Bacteria (LABs) during fermentation. Students will initiate cucumber fermentations and manipulate both the salt types and concentrations during the brining step. Over 4 weeks, students isolate microorganisms from the fermentation brine using selective media, measure the brine pH, glucose levels, and characterize both the morphological and physiological properties of bacterial isolates. Advantages to this lab redesign include: student data can be “crowd-sourced” across multiple lab sections, replicates can be easily obtained, multiple variables can be manipulated across sections or semesters, collaboration with industry, and the potential for future metagenomics studies. Due to the nature of the authentic experimental questions, the student-generated data would contribute to our understanding of microbial ecology and answer fundamental questions relevant to the USDA on food safety and benefit North Carolina’s vegetable fermentation industry.

ASM Curriculum Guideline Concept(s): Impact of microorganisms, Microbiology laboratory skills

How to Create a Superbug: New Laboratory Modules to Expand Upon a Course-Based Research Experience
Jennifer Larson, Suad Ali, Ellen E. Andrews, Niko Masters, and Trevin S. Simmons, Capital University, Columbus, OH.

Denver

The Prevalence of Antibiotic Resistance in the Environment (PARE) project was initiated three years ago as a way of engaging more undergraduates in an authentic research experience. This project asks undergraduate students to collect soil samples from locations of their choosing and to determine the percentage of antibiotic-resistant bacteria present in their samples by counting the number of colony forming units on plates with and without an antibiotic. One of the strengths of this course-based undergraduate research experience is that it can be completed in just a few weeks during a semester. However, an additional strength of this project has also emerged in that it can be expanded upon in a number of ways to make it a larger component of a laboratory course and to expose undergraduates to additional research methods. Two different experiments were piloted with the help of four undergraduate students that had already participated in the PARE project. The goal of the first experiment was to demonstrate horizontal gene transfer by isolating DNA from the antibiotic-resistant bacteria and using it to transform an antibiotic-sensitive strain of E. coli, making these E. coli antibiotic-resistant. The PARE project currently collects information on resistance to tetracycline. The goal of the second experiment was to survey the tetracycline-resistant bacteria for resistance to additional antibiotics. The results of these two new research components will be described along with additional ideas for further expansion of the PARE project.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research, Microbiology laboratory skills
**MICROBREW F: 3:10 PM – 3:25 PM**

**Student-Driven Independent Research Investigations in an Introductory Majors’ Microbiology Laboratory Course**

Brinda Govindan, Joseph Romeo, Armin Akhavan, Anjana Amirapu, Lily Chen, San Francisco State University, San Francisco, CA.

*Tower Court A*

In a large urban university setting where the majority of students are commuters, opportunities are limited for providing all biology majors with authentic laboratory research experiences. We addressed this challenge by redesigning the curriculum of a majors’ introductory microbiology laboratory course to focus on inquiry based research projects. We wanted to know whether these projects would increase student engagement and their understanding of the process of science. In this new format, students learned basic lab techniques in the first month of the course and began applying these and other acquired technical skills to answer a research question of their own design based on their personal interest in the topic. After brainstorming during the first few weeks of the semester, students conducted background research, developed and wrote proposals for their research project. All proposals were subjected to both peer review and instructor/GA feedback before the experimental phase of the project began. Students collaborated in pairs and developed their organizational skills by planning, troubleshooting and implementing their projects over a six-week period. At the end of the semester all students showcased their findings to peers, faculty and staff in a poster presentation. In addition, all groups prepared a written report documenting their research project. Response to this redesign has been enthusiastic, with 88% of students (n=44) reporting that if time and resources were not an issue they would want to continue their projects. Our assessments included student surveys and analysis of experimental design skills with the EDAT rubric (Sirum and Humburg 2011). Preliminary assessments indicate that students acquired increased understanding of the process of science, improved their research design skills, and gained confidence as a result of this experience.

In this Microbrew, we will provide examples of student projects and discuss the timeline and support requirements for implementation.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research, Microbiology laboratory skills

**Lessons Learned From Organizing and Evaluating an Undergraduate Research Symposium**

Emily M. Nowicki, The University of Texas at Austin, Austin, TX.

*Tower Court B*

It should come as no surprise to STEM educators that undergraduate participation in scientific research leads to measurable improvement in experimental design, execution of research, and data collection (Bauer and Bennett, 2003). In fact, a recently published, well-controlled, multi-year study demonstrates that undergraduate research even improves retention and graduation of majors in the sciences by 25% (Rodenbusch, 2016). An important component of participation in research is the ability of students to effectively communicate their research to the scientific community. Several reports suggest that presentation of undergraduate research at local meetings leads to gains in student confidence and understanding of science, and is viewed by the students as a formative and valuable experience in their scientific development (Zito, 2015; Potter et al., 2010). These and other studies suggest that undergraduate students can benefit greatly not only from conducting authentic research, but also from the opportunity to formally present their findings. In Fall 2015, I had the privilege to help organize the inaugural Fall Undergraduate Research Symposium at the University of Texas at Austin, inspired by Rice University’s Gulf Coast Symposium. This day-long conference is open to both UT and non-UT STEM undergraduates and consists of student oral presentations grouped by topic, a keynote speaker, and an award ceremony. This past fall I surveyed symposium participants to determine how valuable they viewed their experience presenting, as well as to obtain general feedback. This short survey asked students to indicate a numerical score corresponding to the degree in which presenting in the symposium affected several factors of their scientific development. In this presentation, I will discuss the structure and behind-the-scenes organization of our Undergraduate Symposium, comment on aspects that worked well as well as those that could be improved, and highlight the results of my survey.
ASM Curriculum Guideline Concept(s): Advancing STEM education and research, Microbiology laboratory skills

Winogradsky’s Battery: Visualizing Electron Potential in a Sediment Column

Craig Phelps, Rutgers, The State University of New Jersey, New Brunswick, NJ.

Tower Court C

Understanding the connection between bacterial metabolism and electrical potential can be difficult for students. Bacterial cells are “powered” by capturing some of the energy released during oxidation-reduction (redox) reactions, and the amount of energy available to them is directly related to the electron potential of the redox reactions that they are able to carry out. However, the electrical aspect of this energy is generally only discussed as an abstract property of the different redox reactions.

By using a modified type of Winogradsky Column to simulate the conditions found in stratified sediments, we can allow the students to directly visualize the generation of an electrical potential by environmental bacteria. The voltage that they measure is a reflection of the energy available to the bacteria. They can then correlate the electrical activity to a chemical gradient in the sediment.

The columns are easily constructed using household materials (tennis ball canisters, silicone caulk and artist’s graphite) and filled with mud, sand and water. Over the course of several weeks, the metabolism of bacteria in the sediment establishes a redox gradient that can be directly measured using a voltage meter. The gradient can also be demonstrated by using a simple ferrozine assay to measure the amount of reduced iron at different depths or simply visualized by observing changes in color of the sediments.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research

Microbiology Pictionary: An Engaging and Competitive Classroom Activity to Review Course Material

Kara Mosovsky, Moravian College, Bethlehem, PA.

Tower Court D

From a pedagogical standpoint, frequent recall and review of course content can help students achieve deeper learning of the material. Microbiology pictionary was developed as a fast-paced, energy-rich review tool, which has proven time and time again to keep students engaged, laughing, and learning. Splitting the class into 2 competing teams, and tempting them with a few extra credit points, we begin our game. Two students (one from each team) simultaneously draw on the board, while their teammates frantically guess at the same secret word. The first team to correctly guess the drawing, wins a point. Throughout the friendly competition, students are required to think differently about the vocabulary and scientific terms that they have learned all semester. Students who are drawing must additionally portray their ideas on the chalkboard, sometimes in very creative or round-about ways. The result is a fun and stimulating review session of microbiology. In an anonymous survey administered after the game, about 90% of students found the activity to be an “effective” or “very effective” strategy to review previously covered material from the course. Out of those who took the survey, 100% rated microbiology pictionary as a fun classroom activity, and 100% would recommend it for future semesters. I will share some of my successes with implementing microbiology pictionary, as well as some areas for improving this activity as an even better review strategy. I will elaborate on the format that I use in my course, though the basis of the game can be adjusted for any individual classroom or course. With microbiology pictionary, the rules are simple, there is almost no required preparation, and the game is sure to engage everyone in discipline-specific review.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research

Game-Based Learning: Board Games That Teach Biological Concepts

Jamie Cunningham, Johnson County Community College, Overland Park, KS.

Silver

In recent years the boardgame industry has seen remarkable growth. Tabletop game purchases have risen between 25% and 40% annually as thousands of new titles are released each year. Thanks largely to crowdfunding options, we have seen the emergence of games created by scientific educators and based around core concepts in biology, chemistry and evolution. This microbrew will focus on boardgames designed for science education, especially those that are based on microbiology concepts.
**Using Hops to Implement Intercampus and Interdisciplinary Collaborative Research Projects for Undergraduates**

**Kristen Swithers (1) and Amanda Petrus (2), (1) Southern Connecticut State University, New Haven, CT, (2) University of Bridgeport, Bridgeport, CT.**

**Spruce**

Compartmentalization is a common issue seen in many undergraduate classes, as students lack the experience to realize that scientific knowledge is cumulative, not compartmentalized. For instance, they’ll learn the concepts in a chemistry class and then they won’t transfer those to overlapping fields such as biology. They often move on to a microbiology and a biochemistry class without realizing there is significant overlap between the two courses. The more interdisciplinary course crossovers students are exposed to the more the compartmentalization of courses should break down and this will strengthen performance in STEM subjects.

In order to address this compartmentalization issue, students enrolled in organic chemistry, biochemistry and pathogenic microbiology at two universities engaged in an interdisciplinary project to assess the antimicrobial and anti-inflammatory properties of hops. Students in organic chemistry performed distilled water and ethanol extractions of two different hops varieties, which were then sent to students in pathogenic microbiology and biochemistry. The pathogenic microbiology students performed disc diffusion assays to assess antimicrobial activity against a specific bacterium and the preformed liquid broth dilutions to determine the minimal inhibitory concentrations of the hops against their bacterium. The biochemistry students performed lipoxygenase inhibition assays to determine the anti-inflammatory activity of the hops. Students were required to work remotely using Skype and Google Docs to communicate methods and results between classes and universities. At the end of the semester all students collaborated to put a poster together incorporating the organic chemistry, microbiology and biochemistry components. Not only did this project-based crossover approach address compartmentalization of subjects, it also provided students with experience in interdisciplinary remote collaborations.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research

**Antimicrobial Effectiveness of Holistic Oils**

**Kenzi Brooks, Seminole State College of Florida, Sanford, FL.**

**Denver**

This experimental study was joint student-faculty research conducted to determine the antimicrobial effects of a topical holistic oil remedy for diaper rash. Tea tree, lavender, coconut and grapeseed oils were tested against Staphylococcus aureus, Escherichia coli, Proteus mirabilis, and Pseudomonas aeruginosa using a Modified Agar-Well Diffusion Method. The yeast species tested were Candida albicans, C. tropicalis, C. lusitaniae, C. neoformans, and Rhodotorula rubra. Preliminary results indicate that tea tree and lavender oils were inhibitory to all bacteria and yeasts tested. Coconut and grapeseed oils failed to show antimicrobial effects. Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) determinations were run to quantify the effects of tea tree and lavender oils on select Gram positive and Gram negative bacteria. The findings of this study is promising and as an offshoot to this, follow up work is underway to test other holistic oils with potential medicinal uses.

**ASM Curriculum Guideline Concept(s):** Impact of microorganisms, Advancing STEM education and research
### MICROBREW SESSION III OF III
#### SATURDAY, JULY 23

#### ROOM LOCATION

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<th>Tower Court C</th>
<th>Tower Court D</th>
<th>Silver</th>
<th>Spruce</th>
<th>Denver</th>
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#### MICROBREW G: 3:45 PM – 4:00 PM

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<th>Microbiology in a Hybrid Classroom: Is it Feasible, Rigorous and Credible?</th>
<th>Creation and Utilization of Concept Frameworks as a Course Guide</th>
<th>Creating Virus Web Sites in a Hybrid Classroom</th>
<th>Mitosis and Meiosis in Motion: Students Playing the Part of Chromosomes, Spindle Fibers, and Nuclear Envelopes</th>
<th>Flipped Classroom Activities in Microbiology</th>
<th>Addition of an Inquiry-Based Microbiology Research Project to the Identification of Unknowns’ Laboratory in Order to Positively Impact Student Learning</th>
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<tr>
<td>John Kyndt, Bellevue University</td>
<td>Caitlin Reeves Williams, University of Georgia</td>
<td>Margaret Richey, Centre College</td>
<td>Mary Shawgo, Graceland University</td>
<td>Sean Coleman, University of the Ozarks</td>
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#### MICROBREW H: 4:05 PM – 4:20 PM

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<th>Development of a Virtual Laboratory Bacterial Unknown Assessment Tool</th>
<th>Use of ‘Kahoot’ as an Online Assessment Tool in Microbiology</th>
<th>A Microorganism Profile Assignment to Engage Nursing Students</th>
<th>PowerPoint Books: An Alternative to Online Lectures</th>
<th>Using a Semester-Long Inquiry-Based Lab on Biofilm Formation to Teach the Scientific Method</th>
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<tr>
<td>Melissa Eslinger, United States Military Academy, West Point</td>
<td>Tony Slieman, New York Institute of Technology College of Osteopathic Medicine at Arkansas State</td>
<td>Becky Aloo, University of Eldoret</td>
<td>Elizabeth Vaughn, Galen College of Nursing</td>
<td>Krys Adkins, Drexel University College of Medicine</td>
<td>Amy Beumer, University of Cincinnati, Blue Ash College</td>
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#### MICROBREW I: 4:25 PM – 4:40 PM

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<th>Using Machine Learning to Explore Student Thinking in Constructed Responses – An Example of Enzyme Binding Structure and Function</th>
<th>Keeping the Nursing Microbiology Lab Relevant: Low Cost Tablets as Photomicrograph Documentation and Electronic Record-Keeping Tools</th>
<th>Leveraging Classroom Response Systems for Both Readiness-Assessment and Collaboration in Introductory Classes</th>
<th>Naturalist: Creating Digital Biodiversity Collections in an Introductory, Inquiry-Driven Laboratory Course</th>
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<tr>
<td>Adam Kleinschmit, Adams State University</td>
<td>Rachel Yoho, Michigan State University</td>
<td>Amy Spremkle, Salem State University</td>
<td>Nancy Boury, Iowa State University</td>
<td>Kevin Floyd, The University of Texas at El Paso</td>
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MICROBREW SESSIONS (III OF III)
3:45 PM – 4:40 PM
(6 Sessions)

These grassroots sessions, arranged by topics, provide a forum for sharing best practices and interesting activities used in laboratory and classroom teaching. Presentations are simple “chalk talks” (e.g., no PowerPoint) to facilitate informal discussion. Unlike the poster sessions, Microbrews do not require assessments. Sessions will be facilitated by volunteer attendees in order to make certain each presentation stays within the 15-minute presentation (10-minute presentation and 5 minutes for discussion). Sessions must stay on time so attendees are able to move from room to room quickly to see their desired session.

Session Room Facilitators:

Tower Court A
Facilitator: Jason Baker, Missouri Western State University

Tower Court B
Facilitator: Marsha Gaston, University of Cincinnati – Blue Ash College

Tower Court C
Facilitator: Mazie Mizelle, Monroe Community College

Tower Court D
Facilitator: Rachel Pritchard, Kentucky Wesleyan College

Silver
Facilitator: Brenda Rushing, Texas A&M University – San Antonio

Spruce
Facilitator: David Wessner, Davidson College

We recently completely redesigned and upgraded our teaching rooms and labs with the main purpose to integrate more collaborative research opportunities for our undergraduate students. Since we have a large online student population in other disciplines we also integrated technology for hybrid/online classes in the science lab upgrade. While this remodel has been a major advancement to enhance the classes, there is also a significant amount of technology that is currently underused. The integration of hybrid classroom technology, which allows students to be virtually present in the classroom, has many advantages as it opens up possibilities for flipped classrooms, virtual group discussions and presentations, remote collaborations, and flexibility in residential courses. However it also creates significant challenges for curriculum redesign, especially in lab class integration. This presentation will provide an overview of the available technology and how it is already being used to enhance our undergraduate science courses. We are currently experimenting with various concepts of teaching hybrid science classes and would certainly welcome ideas or feedback in an open discussion.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research

Creation and Utilization of Concept Frameworks as a Course Guide

Caitlin Reeves Williams, University of Georgia, Athens, GA.

Tower Court B

Effective course design lies in the identification and organization of key learning objectives. Additionally, departments often juggle multiple instructors for one course and material may vary widely dependent on who is teaching. To help create concepts that align with ASM’s curriculum guidelines and provide course consistency among instructors, a concept framework was developed. Construction and implementation of a concept framework for an undergraduate allied health microbiology course based on the overarching learning objectives will be discussed. The concept framework breaks down the main objectives of the course into sub objectives with key facts/concepts nested under each sub objective. Interrelated concepts can be referenced within the framework to help connect topics together. The framework is intended for use by instructors and students as a course guide, giving them a “roadmap” of material to be covered and illustrate how ideas
are interconnected. At the start of each unit the instructor can give a brief overview of content to be covered and connect it to the objectives of the framework, helping students to keep track as they move through the course. The framework also helps to keep course expectations consistent from one semester/professor to the next. Effectiveness of the concept framework can be assessed by a pre- and post-survey of the course based around the learning objectives. The concept framework provides a guide for teaching purposefully, with a way to promote engaged student learning by creating effective active learning strategies with a focus on essential learning concepts.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research

Creating Virus Web Sites
Margaret Richey, Centre College, Danville, KY.

Tower Court C

Scientific information can be misunderstood or misused if it isn’t effectively communicated. A web site assignment in an upper-level Biology of Viruses class helps students sharpen their writing and visual presentation skills so that they can accurately, effectively and creatively communicate scientific information. Students work in groups of 3-4 to research a virus family regarding its biology (structure, replication, host range, transmission and prevalence), the prevention and/or treatment of diseases caused by members of this family, and the historical importance/impact of this family on the world. This information is presented on a group-designed web site with multiple pages for a peer audience. The web site is expected to include narrative text, illustrations, images, animations, quizzes and/or tutorials about the virus family. To develop the web content, students can use any legitimate, scientifically accurate source of information. In-text citations are expected to be used for all content on the web site and each web site includes a “Literature Cited” page that has the complete citation of each source used in the web site, including image sources. Prior to beginning work on the web site, students attend a workshop on how to develop a web site in Google Docs by a staff member in our Center for Teaching and Learning. Grading criteria for the web site include the accuracy and thoroughness of the content; proper in-text citations and the proper use of images (figure number, title, legend, citation); the organization of the site and ease of navigation around the site; and visual impact (design, attractiveness, ease of reading). Each student turns in a work attribution form when they submit the link for their web site. Students receive a team grade and an individual grade for the web site. Examples of web sites will be shown.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research

Mitosis and Meiosis in Motion: Students Playing the Part of Chromosomes, Spindle Fibers, and Nuclear Envelopes
Lacy M. Cleveland and Thomas M. McCabe, University of Northern Colorado, Greeley, CO.

Tower Court D

In this session, participants will assume the role of the student and participate in an activity wherein students physically act out the role of chromosomes, spindle fibers, and nuclear envelopes during mitosis and meiosis. Attendees will be provided information on how to implement this activity in a small or large course as well as pre- and post-test materials to measure gains in students’ conceptual understanding of cell division. We have used this exercise at our home institution and will provide insight from past implementations as well as space for a discussion of modifications for participants’ individual contexts.

ASM Curriculum Guideline Concept(s): Cell structure and function, Information flow and genetics

Flipped Classroom Activities
Mary E. Shawgo, Graceland University, Lamoni, IA.

Silver

The use of good in-class activities that requires students to use or apply their knowledge is essential in a flipped classroom. Engaging activities or a lack of engaging activities can make or break a flipped classroom. Given that my first attempts at implementing the flipped classroom were a painful disaster, I quickly learned that I needed better activities. I needed activities that 1) reviewed the content, 2) allowed time for the students to develop questions on the material, 3) allowed time for students to ask each other and the instructor questions, and 4) had the students apply and start to critically think about the material. This presentation will discuss/give you activities for your students to help them learn class material and how to start applying it. I have used activities specifically for the following class content: structure of the cell, transport.
through membranes, electron transport chain, DNA replication, transcription, translation and the lac operon. Come participate in an activity, walk away with prepared materials, and share by discussing what activities you do.

**ASM Curriculum Guideline Concept(s):** Cell structure and function, Information flow and genetics

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**Addition of an Inquiry-Based Microbiology Research Project to the ‘Identification of Unknowns’ Laboratory in Order to Positively Impact Student Learning**

Sean T. Coleman, University of the Ozarks, Clarksville, AR.

**Spruce**

Historically, microbiology laboratories at undergraduate-only institutions include learning aseptic technique, microorganism propagation, and identification. These courses often culminate in a project involving identification of an unknown microorganism. This exercise is successful in that students gain the ability to use learned techniques, follow a microbe identification key, problem solve, and critically think about results. Inquiry-based learning has been shown to have a positive effect on student learning. As part of a move to incorporate more inquiry-based learning into classes I designed a student-driven environmental biology research project as incorporating unknown microorganism identification. The transition occurred over three semesters. The first semester students designed short projects to isolate microorganisms from surfaces around campus. Then I implemented short instructor-guided environmental microbiology projects. These projects were separate from the instructor-provided identification of unknowns laboratory. Following the positive reception of these exercises I combined them into an environmental microbiology investigative project. The lab includes outputs of a research proposal, laboratory notebook, and conference style poster of their findings that is presented to the university community. Successful projects have included studies as varied as comparing microorganisms between primary and secondary contact bodies of water and comparing coliform bacteria counts in men’s versus women’s restrooms. The five week laboratory culminates in the identification, to genus, of at least one bacterium. The exercise has been expanded to include antibiotic testing of identified bacteria using Kirby-Bauer sensitivity testing. The next addition to the laboratory will be using Biolog’s Microbial ID system to check how many student groups correctly identified their bacterium. After the poster session students were asked to complete an anonymous survey about the effectiveness of the research project. Student responses have been extremely positive.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research, Microbiology laboratory skills

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**MICROBREW H: 4:05 PM – 4:20 PM**

**A Guided Exercise to Improve Scientific Literacy and Critical Analysis Skills**

Melissa Eslinger, United States Military Academy, West Point, NY.

**Tower Court A**

A primary goal of the curriculum at the US Military Academy is to encourage critical thinking and foster the skills necessary to become a life-long learner. Among cadets, we have observed two major pitfalls in regards to primary literature. One is the misunderstanding as to what actually constitutes primary literature. The other, and more importantly, is that cultivation of the skills necessary to analyze primary literature is absent in the early undergraduate curriculum. We have generated a guided activity which directs cadets enrolled in Introductory Biology for Non-Majors, a novel course, to work in groups of 2-3 to analyze a primary article. Following Instructor verification of primary sourcing, groups follow specific instructions to complete their analysis. Beginning with identification of the problem statement or research question, students determine whether the approach to the problem or question was valid, identify any bias within the argument, and see how the study aligns with current knowledge in that particular field. Components of the written analysis prepared by each group include: study design, statistical analysis employed by the researchers, and examination of the strength and validity of any evidence based conclusions. Specific directions outlining the analysis along with the final grading rubric are made available to all groups through the assignment entirety. To underscore the importance of the verbal component of scientific literacy, groups present their analysis as a capstone event during in-class presentations. These presentations are assessed on format, content, and delivery. Digesting primary literature takes time, experience and make for an informed, life-long learner. In so doing, this
develops a skillset that is beneficial regardless of academic discipline. With this tool, the practice of analyzing primary literature should be implemented, where appropriate, early on in the undergraduate curriculum.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research

**A Microorganism Profile Assignment to Engage Nursing Students**

Elizabeth Vaughn (1), Jennifer Lee (2), Keith Prokopp (3), Laura Johnston White (4), Jennifer Stewart (2), Elizabeth Trujillo Lopez (2), Brian Kuyatt(3), and Erin Lentz (2), Galen College of Nursing, (1) Louisville, KY, (2) San Antonio, TX, (3) Tampa Bay, FL, (4) Cincinnati, OH.

Tower Court B

An understanding of pathogenic microbes and infectious disease processes is critical to nursing education. To facilitate this process, students are given a Microorganism Profile assignment at the understanding of microscopy. These results were similar when separated to fall and spring semesters.

Conclusions: This novel learning and assessment exercise presents a reliable, reproducible and economical alternative tool to a microbiology wet-lab experience. This also differentiates between students who need additional learning support, especially in the plates/biochemistry section.

**ASM Curriculum Guideline Concept(s):** Microbiology laboratory skills

**Use of ‘Kahoot’ as an Online Assessment Tool in Microbiology**

Becky Aloo, University of Eldoret, Eldoret, Kenya.

Tower Court C

‘Kahoot’ is an online teaching tool that is very appropriate in testing students in class about things learnt or to be learnt meaning it can be used as a pre-assessment tool or post-assessment tool. The user has to create an account online, set the questions as desired using the available guidelines, set up to four multiple choice answers and indicate the correct answer. The user can also set as many questions as possible and as many sets as possible. The learners connect to the internet using their phones or laptops and access the specific ‘kahoot’ using a key that’s given by the user’s account. The learners can work individually or in groups and answer the questions as fast as they can, the faster the answer is provided, the more the reward points. At the end of the lesson, top performers can be rewarded as desired by the creator of the ‘kahoot’. It combines learning with a game-like activity and makes learning awesome, enjoyable and memorable.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research

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**Development of a Virtual Laboratory Bacterial Unknown Assessment Tool**

Tony A. Slieman, Ph.D. and Viswanathan Rajagopalan, Ph.D., New York Institute of Technology College of Osteopathic Medicine at Arkansas State, Jonesboro, AR.

Tower Court B

Background: A fundamental part of traditional microbiology laboratory experience often includes an unknown bacterial exercise offering a cumulative assessment of student learning. This exercise also meets two of the competencies and skills recommended by the ASM curricular guidelines. However, availability of space, staff, time and cost can be challenge and limitation for successful open wet-lab experience. Although few published virtual (web-based) bacterial unknown simulation tools are currently available, they require monetary investment or are limited as self-help/learning tools. We hypothesized that a novel, virtual exercise incorporates both unknown bacterial sample identification and process flowchart assignment would offer a reliable and inexpensive laboratory learning and assessment tool.

Methods: A total of 219 allied health students from the 2015-2016 academic year completed this assessment tool online at the University of South Dakota. Microscopy and plates/biochemistry components were scored separately. In addition to identification of the correct unknown, students were also evaluated for development of comprehensive flowchart describing their identification process.

Results: Data analysis revealed that vast majority of students were able to identify the correct bacterial unknowns (92.7%). Average class score on constructing flowchart was a low 58.5%. We found a significant positive correlation between performances in the plate/biochemistry and flowchart sections (p<0.001). The higher the scores in plate/biochemistry, the better the flowchart scores and vice versa. Conversely, only a weak correlation existed between microscopy and flowchart sections, indicating most of the students fared well in the use of ‘Kahoot’ as an Online Assessment Tool in Microbiology

Becky Aloo, University of Eldoret, Eldoret, Kenya.

Tower Court C

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**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research

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**A Microorganism Profile Assignment to Engage Nursing Students**

Elizabeth Vaughn (1), Jennifer Lee (2), Keith Prokopp (3), Laura Johnston White (4), Jennifer Stewart (2), Elizabeth Trujillo Lopez (2), Brian Kuyatt(3), and Erin Lentz (2), Galen College of Nursing, (1) Louisville, KY, (2) San Antonio, TX, (3) Tampa Bay, FL, (4) Cincinnati, OH.

Tower Court D

An understanding of pathogenic microbes and infectious disease processes is critical to nursing education. To facilitate this process, students are given a Microorganism Profile assignment at the
beginning of the term. Each learner is randomly assigned a pathogenic microbe during the first week of class, along with a template for the written presentation. The premise is simple—beginning on the day of the assignment, each learner essentially “owns” the microbe they are assigned. Information for this assignment is to be gathered sequentially over the course of eight weeks as new concepts are learned both inside and outside of class. Instructors facilitate the process with educational practices that stimulate inquiry and critical thinking, which learners use to supplement their basic course content as they develop their Microorganism Profile. The Microorganism Profile report addresses eight different topics; including a morphological description of the organism, virulence factors, a hypothetical patient presentation (signs and symptoms), the host immune response, treatments, methods of prevention and epidemiology. Further instructional support for the Microorganism Profile report occurs during discussion questions embedded within the web-assisted course, in which students discuss their organism’s basic characteristics, describe their organisms in the nursing context or as they relate to infectious disease, epidemiology of the organism, and the most recent morbidity and mortality statistics from the CDC website. Each learner submits their final report, which is graded against a rubric that looks for evidence of independent, scholarly inquiry, fact seeking objective reasoning, and comprehensive and associative understanding of the pathogens.

ASM Curriculum Guideline Concept(s): Impact of microorganisms

PowerPoint Books: An Alternative to Online Lectures

Krys Adkins, M.Ed., Elise M. Mosser, Ph.D., Drexel University College of Medicine, Philadelphia, PA.

Silver

In 2013, as online education was becoming more prevalent, our Microbiology and Immunology Department made a strategic decision to offer students an online version of our traditional lecture-based courses. At the time, we had several options for producing online lectures, including lecture capture, video or audio productions, and slide presentations. However, these options were not student-friendly: the materials did not allow for any active learning interactions other than taking notes; the format did not easily comply with Drexel University’s accessibility standards; and the navigation did not allow students to easily locate and review segments of the lecture. Furthermore, since our professors would be the ones responsible for producing the lecture material, we needed a solution that was inexpensive, easy to use, and available on different computer platforms. For all these reasons and more, the PowerPoint book format was developed.

The PowerPoint book is an interactive e-book created with the ubiquitous PowerPoint software. Using a customized template and layout, the slides became the book pages. Pages can contain elements such as text, audio, photos, video, web links, animations, quizzes, and a variety of interactions. As students read the book, they interact with the content. Our professors write the text and specify on which pages they need one of the other elements. Our instructional development team use the iSpring or Articulate applications to insert the elements, complete production, and convert the file into HTML5. We then upload the PowerPoint book files into our LMS for students to use.

We are now in our third academic year using the PowerPoint book format. Although we now offer professors other ways to create lecture materials, we find that both the professors and students prefer the PowerPoint books.

ASM Curriculum Guideline Concept(s): Advancing STEM education and research

Using a Semester-Long Inquiry-Based Lab on Biofilm Formation to Teach the Scientific Method

Amy Beumer, University of Cincinnati–Blue Ash College, Blue Ash, OH.

Spruce

A research experience is not something most first and second year students have access to, particularly at a primarily two-year institution focused on teaching. However, these experiences can lead to increased understanding of the scientific method as well as increased confidence and enjoyment in science. Here I present an affordable, semester-long lab on biofilm formation for first semester biology majors, that was implemented in the spring of 2017. Students were given a basic research question topic, biofilm formation, and a model system. After a short presentation on biofilms, students worked in groups of three to list questions about biofilms then hypotheses. I collected these and marked hypotheses from each group that would be feasible, leaving the
Students were given a basic model system consisting of a bioreactor with drinking water or surface water as the growth medium. The mason jar bioreactor, modified from Biofilms: The Hypertextbook by Cunningham et al., was chosen due to its cost effectiveness and ease of use. I chose to use only surface water or drinking water so that biofilms would grow more slowly and to avoid growing pathogens or large bacterial populations that might pose a risk. Student groups drew or wrote up a basic experimental design on whiteboards, then set up their experiments the next week. Biofilms were allowed to form over four weeks, during which students recorded changes as per their experimental design. Students were given methods, modified from O'Toole, for further analysis after the four weeks and chose how to apply these given their specific experimental design. All student groups were successful in growing biofilms, and most groups saw marked differences between their treatments. Finally, each group presented their findings to the lab as a whole and individually submitted a scientific paper.

ASM Curriculum Guideline Concept(s): Impact of microorganisms, Microbiology laboratory skills

MICROBREW I: 4:25 PM – 4:40 PM

A Model-based Riboswitch Activity for Instruction on Microbial Gene Regulation

Adam Kleinschmit (1), Catherine Vrentas (2), Julia Massimelli (3), and Jacob Adler (4), (1) Adams State University, Alamosa, CO, (2) The Engaged Scientist Project, Ames, IA, (3) University of California Irvine, Irvine, CA, (4) Brescia University, Owensboro, KY.

Tower Court A

Genetic regulatory mechanisms are a major content area under ASM’s Curriculum Guidelines for Microbiology education. However, previous research demonstrates that students struggle with understanding and application of the central dogma, making comprehension of more advanced regulatory concepts challenging. We designed an active learning activity, appropriate for implementation in introductory through advanced level microbiology classrooms, that provides students the opportunity to physically interact with models of bacterial riboswitches. The physical models reinforce key concepts in gene expression/regulation, with a goal of creating learning gains in students’ abilities to predict the outcome of regulatory mechanisms in the bacterial cell. In the classroom activity, students work in groups with a cost-effective bag of supplies, which includes beads and pipe cleaners, to model two different conformations of a riboswitch in a bacterial RNA transcript. Upon completing the activity, students reflect on concepts with small group and whole-class discussion questions, which are integrated into the lesson. As a part of the development process, we have prepared a classroom-ready PowerPoint presentation and associated student handouts. To refine and pilot this curriculum activity, we implemented the activity in upper-level microbiology and molecular genetics classrooms at three universities (a Ph.D. level research university and two primarily undergraduate institutions). Likert-type pre- and post-activity questionnaires indicate student-reported gains in their perceived understanding and confidence on the topic of riboswitch-associated regulation. Student free response survey feedback also indicated a positive response to this activity. Additionally, we have developed optional extension activities for use with more advanced undergraduates or even graduate students, including ways to apply the methodology to compare and contrast attenuators and riboswitches as a means of developing deeper understanding of regulation and the transcriptional and translational levels in bacteria.

In this microbrew, participants will have the opportunity to make a physical model of a riboswitch within working groups.

ASM Curriculum Guideline Concept(s): Cell structure and function, Information flow and genetics

Using Machine Learning to Explore Student Thinking in Constructed Responses – An Example of Enzyme Binding Structure and Function

Rachel Yoho, Tanner Foster, Kevin Haudek, Mark Urban-Lurain, John Merrill, Michigan State University, East Lansing, MI.

Tower Court B

The Automated Analysis of Constructed Response (AACR) research group (www.msu.edu/~aacr) develops computer-automated tools to analyze student writing by predicting expert rating of the writing. These techniques use machine learning to provide scalable scoring of formative assessment questions investigating key concepts in the biological sciences. These tools can be implemented for Just-in-Time-Teaching strategies. As an example, enzyme binding represents the central idea of “structure
and function” in biology education. Students must develop a complex framework of three-dimensional structures, their functions, and binding energetics in order to understand enzyme binding. As an example of our question development cycle, we will show how introductory biology and biochemistry textbooks represent this topic \((n = 10)\), results of student responses for three versions of an enzyme binding question, and the preferred responses of instructors \((n = 5)\). We show how this method can be used to investigate student thinking at the introductory \((n > 500 \text{ student responses})\) and advanced \((n = 147)\) levels. In this example, our exploratory text analysis of responses reveals that students favor structure-related ideas, while using words such as “lock-and-key” and “induced fit,” to describe why enzymes bind to their correct substrates. Using alternate question versions, instructor preferred responses, and analysis of textbook presentations, we will discuss the educational implications for instructor teaching and student learning of “structure and function” of enzymes. In this context, we will present how machine learning can be used to assess authentic student writing and provide formative feedback to instructors about their students, through a technique that can be scaled even to large lecture courses. As instructional resources, the AACR group has a number of questions developed in the biological sciences that can be used for just-in-time teaching techniques.

**ASM Curriculum Guideline Concept(s):** Cell structure and function, Advancing STEM education and research

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Keeping the Nursing Microbiology Lab Relevant: Low Cost Tablets as Photomicrograph Documentation and Electronic Record-Keeping Tools

Amy Sprengle and Sheila Schreiner, Salem State University, Salem, MA.

Tower Court C

Let’s be honest; nursing students hate microbiology, and will never have to perform clinical microbiology tasks. They will have to do a lot of charting and patient education in their futures as healthcare professionals. Why not use the microbiology laboratory to introduce the appropriate skills? Purchasing student microscope camera systems is prohibitively expensive, and using a cell phone to photograph through the ocular requires a skilled, steady hand. The larger tablet format allows the user to brace against both oculars and delivers images adequate to the desired report output. The tablet also provides access to electronic lab manuals, open source electronic lab notebooks, and online learning environments all in one convenient device that can be controlled as a teaching lab asset, without limiting student access to the materials outside of the lab. An experiential learning ‘microbe hunter’ lab plan with regular lab reports created with use of the tablets and microscopes combined with an epidemiological case-study based lecture is designed to keep the laboratory relevant and the nursing students engaged.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research, Microbiology laboratory skills

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Leveraging Classroom Response Systems for Both Readiness-Assessment and Collaboration in Introductory Classes

Nancy Boury, Iowa State University, Ames, IA.

Silver

Classroom response systems or “clickers” have been in common use for over a decade and there are many different ways to harness the power of instant response. There is some debate as to whether clickers should be used in grading, as a means of student engagement, or both. Grading each response opens the door to errors in technology altering student scores. Using clickers solely for engagement often decreases student participation or literal buy-in, as students choose not to purchase the clicker or access code if there is no grade benefit to participation. In this session we will demonstrate a method to strike a balance between these two extremes. Participants in this microbrew will take part in paired question exercises, where students reply to questions as individuals, discuss in groups, and then answer collaboratively. This method is useful for vocabulary exercises, case studies, or analysis of primary data. It forces individual accountability and fosters collaboration and discussion within the classroom.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research

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**iNaturalist: Creating Digital Biodiversity Collections in an Introductory, Inquiry-Driven Laboratory Course**

**Kevin W. Floyd, Teresa J. Mayfield, Jeffrey T. Olimpo, The University of Texas at El Paso, El Paso, TX.**

**Spruce**

Although field-based methods serve as the foundation for creating biodiversity collections, resource limitations often prevent novice students from conducting such studies within the confines of an academic semester. In an effort to approximate this experience, students (n = 15) enrolled in an introductory, inquiry-driven biodiversity laboratory course at our institution spent one, 3-hr. session making observations on campus and uploading their photos to iNaturalist, a low-cost digital platform for identifying and curating species observations. More specifically, iNaturalist allows users to post observations of organisms either from a computer or directly from a smartphone, with or without complete identification, and other members of the iNaturalist community can then help with species identification, as needed. In the subsequent laboratory session, students downloaded all class observations (n = 175) and performed basic data exploration, such as plotting the number of observed plant families. Students also practiced generating research questions based on the compiled data. Student learning was assessed using a series of metacognitive prompts that included questions regarding their self-reported learning gains from making, posting, and analyzing observations. Qualitative analysis of student responses revealed that most individuals (n = 14) experienced challenges in collecting observations, primarily with regard to taking pictures and attempting to identify organisms. Students also struggled with generating research questions from the class dataset. Despite these difficulties, the majority of students (n = 12) appreciated the identification assistance provided by the iNaturalist community and indicated that they had gained an increased awareness of the diversity of organisms in their local environment (n = 11). In this session, we will work cooperatively with attendees to discuss improved methods of incorporating iNaturalist into future classes and to describe potential uses of the platform to conduct expanded, inquiry-based projects.

**ASM Curriculum Guideline Concept(s):** Advancing STEM education and research
DIRECTOR’S CHOICE: HHMI NIGHT AT THE MOVIES
5:00 PM – 7:00 PM
Grand Ballroom I

We’ll screen two clips from the upcoming series that will premiere on YouTube this fall. Based on the bestselling book *I Contain Multitudes* by Ed Yong, each episode tells the story of a microbial partnership with another lifeform and how these relationships shape the planet we live on.

The screenings will be followed by a Q&A session with featured scientist Dr. Colleen Cavanaugh, Harvard University, Dr. Mark Nielsen, HHMI, and Dr. Aileen O’Hearn, HHMI.

DINNER ON YOUR OWN
7:00 PM

Available at ASMscience!
Free, open-access teaching resources.

**Laboratory Protocols Collection**
Standard laboratory tests including the procedural steps as well as the purpose, theory, history, safety considerations, tips and comments, and references.

**Image Gallery**
A collection of images, videos, and animations around a central theme (e.g., Gram stain and MacConkey agar).

**Visual Media Briefs**
Short communications with images, videos, and animations that include an introduction, methods, discussion, and reference section.

**Curriculum Archive**
Peer-reviewed activities promoting active learning in undergraduate microbiology. Developed by faculty at diverse institutions, activities include inquiry-based field-tested materials, student-driven activities, case-based problems, and ideas for independent and/or research projects.

Visit the Reports/Guidelines section of wwwASMscience.org
**BREAKFAST ON YOUR OWN**

**CLOSING PLENARY LECTURE**

**8:00 AM – 9:00 AM**  
*Grand Ballroom I*

**Undergraduate Learning Assistants: It Takes a Village**

Patricia A. Shields, University of Maryland, College Park  
2017 Carski Foundation Distinguished Undergraduate Teaching Awardee

In answering the call to examine our teaching practices and turn to more student-centered learning, we have designed our classes with increasing levels of active learning components. In the large lecture classroom, hands-on tasks, such as modeling and problem solving are often difficult to integrate due to lack of adequate support. This approach can be problematic and for many instructors this is the reason which deters them from implementing the active learning tools which evidence has shown works best for our students. As a lecturer in classes that often exceed 200 students, I turned to the best resources available, upperclassmen looking for leadership opportunities. With guidance, these Undergraduate Learning Assistants (ULAs) have become the teaching partners that have allowed our introductory class to become an active, student-centered, fun exploration of biology. Join us for some Sunday morning activities with our guest ULAs!

**ANCHOR PLENARY LECTURE**

**9:15 AM – 11:00 AM**  
*Grand Ballroom I*

The anchor session will challenge you to reflect upon the lessons learned at the conference, to put your understanding into a larger context, and to align your goals with future actions. Educational thought leaders will address overarching questions during this interactive session, and participants will discuss how these trends and ideas relate to their own campuses and experiences. In addition, participants will develop a clearer vision for the future of higher education and how that will translate to their own work.

**Moderator:** Jeffrey T. Olimpo, The University of Texas at El Paso

**Panelists:**

Yoram Barak, BASF  
Susan Merkel, Cornell University  
Andreas Schirmer, REG Life Sciences  
Catherine Vrentas, Member, ASM Workforce Task Force  
Stephanie Gleason, DuPont Industrial Biosciences
CONFERENCE WRAP-UP
11:00 AM – 11:30 AM
Grand Ballroom I

Here is your chance to contribute and give us feedback about the conference.

END OF CONFERENCE
11:30 AM

Celebrate 25 Years of Teaching Excellence!

25th Anniversary Celebration
ASMCUE 2018
July 26-29
Renaissance Austin Hotel
Austin, Texas

www.asmcue.org
Conference Notes
Meet the Editors

Did you enjoy the JMBE Spotlight issue you received in your conference materials? Two of the Editors behind the issue are here at ASMCUE - keep your eyes peeled for:

Karen Klyczek - Perspectives Editor
University of Wisconsin, River Falls

Heather Seitz - Tips and Tools Editor
Johnson County Community College

Get Feedback

Want to discuss your manuscript idea with an Editor? Need feedback on a work-in-progress draft? Unsure which section would be appropriate for your submission? Consult with JMBE Editors on Friday, July 28th:

7:00-7:45am  Breakfast Roundtable Meet & Greet (South Convention Lobby)

12:30-2:00pm Office Hours for Manuscript Consultation (Tower Court C)
By appointment only. Reserve your slot at the ASMCUE registration table.

6:30-8:30pm  Q&A at the ASM Booth (Grand Ballroom II)

Submit Your Work

JMBE is currently accepting submissions for a special Science Communication-themed issue! All submissions are due by August 7, 2017. Visit asmscience.org/jmbe to learn more and consider submitting your best work today!
Contact jmbe@asmusa.org with questions.
Science Communication Issue
Now Accepting Submissions

About
ASM’s open access, peer-reviewed education journal is currently accepting submissions for a special themed issue on science communication. Possible topics may include (but are not limited to) the following, with an emphasis on biology contexts:

> Evidence-based science communication curricula: best practices and common pitfalls
> Evaluation and impact of various forms of science communication (papers, oral presentations, television, social media, outreach, art)
> Understanding cognitive biases related to scientific topics such as evolution and vaccines
> Encouraging engagement in science-based dialogues
> Using research to build narratives
> Case studies of effective and appropriate science communication
> Partnerships between scientists and communication professionals

Meet the Editors

Emily Therese Clyd
AAAS
Jennifer Garity
Univ. of British Columbia
Jean Goodwin
North Carolina State Univ.
Dennis Morgan
NIH (retired)
Holly Menninger
North Carolina State Univ.
Miriam Segura-Totten
Univ. of North Georgia

Five experts in the field of science communication have teamed together to solicit, review, and organize the issue. JMBE’s Theme Issue Editor will facilitate the review process and ensure all manuscripts meet the scope of the Journal.

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