

A PUBLICATION  
OF THE AICHE  
EDUCATION DIVISION

## UPCOMING EVENTS

### EDU DIV

#### Programming Meeting

Tuesday 11/10  
11:15am-12:15pm  
252A/B Salt Palace CC

#### EDU DIV Dinner & Awards Banquet

Tuesday 11/10  
7:00pm  
Caffe Molise  
[\$65, advanced registration  
is required]

#### EDU DIV Business Meeting

Wednesday 11/11  
11:15am-12:15pm  
Alpine West [Hilton Salt  
Lake City Center]

#### EDU DIV International House of ChE

Wednesday 11/11  
3:15pm  
more info. on [page 2](#)

#### ASEE ChE Div Board Meeting

Monday 11/9  
11:15am-12:15pm  
253A Salt Palace CC

We have our own domain:

<http://www.edudiv.org/>

## Welcome!

### From the Chair's Edge...

This is my second and final year as chair of the AIChE Education Division. I remember being in meetings and working to collect signatures to help form the division, then being elected into the leadership cycle, with two years as vice-chair of programming, two years as chair of programming, and the final two years leading the division. It seems like a long commitment but the time has really flown by, and it has been exciting to watch the division grow.

When the division was getting started, most of the feedback was positive but some feedback contained questions such as "why have an education division," and "is it going to duplicate efforts at ASEE?" The growing membership of the division and increasing quality of programming indicates that the division is off to a great start. The success can be attributed to members from the institute who are equally passionate about educating tomorrow's engineers as they are about their scholarship and research programs. There is no other place but the AIChE Annual Meeting where someone can go down the hallway and listen to the world experts in dozens of technical areas. I am proud that advancements in the knowledge of teaching chemical engineers is now part of that program.

I would like to thank the volunteers of the organization who make the division a suc-

cess. This includes session chairs who work hard to recruit papers into the sessions, the programming chair Taryn Bayles and vice chair Matt Liberatore who do countless hours of behind-the-scenes work to make the program possible, the secretary Ben Davis for keeping good records of our actions and finances, and the directors Robert Hesketh, Tim Anderson, and Norm Loney for helping guide the direction of the division. We also have about a dozen other volunteers who help with other facets of the division, including Christi Luks, Margot Vigeant, Said Abu-Bakr, Chip Howat, Andrew Kline, Milo Koretsky, Daniel Lepek, Marcel Liauw, Douglas Ludlow, Alon McCormick, David Silverstein, Don Visco, and Evan Wujcik. Finally, we are indebted to the endless support of our AIChE staff liaison, Bette Lawler.

It has truly been a remarkable two years. Thank you for the opportunity to serve YOUR division.

Best Regards,

Jason M. Keith  
Dean and Professor  
Bagley College of Engineering  
Mississippi State University



Jason M. Keith, Chair

### Results of the EDUDIV's Election

**Chair:** Taryn Bayles  
**1st Vice Chair:** Matt Liberatore  
**Director:** Polly Piergiovanni  
**2nd Vice Chair:** Ben Davis  
**Secretary-Treasurer:** Katie Cadwell

Congratulations to these newly elected officers!

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# The Value of Desktop Experiment Modules (DEMO)

by Adrienne R. Minerick (Michigan Technological University)

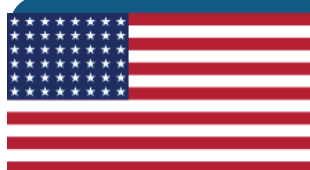
Desktop Experiment Modules or DEMOs are tools to teach students fundamental physical phenomena that are normally abstractly discussed in lectures, in an exciting, hands-on, accessible manner. Attributes of such Desktop Experiment Modules are that they are portable, inexpensive, and straightforward so that a DEMO can be placed in front of each team of two to three students in classes up to ~60 students. DEMOs make cooperative learning in the classroom come alive by allowing students to work in teams to observe, predict, and calculate behaviors. Our group has developed six DEMOs thus

far for courses and outreach. The “Charged Up on Electrophoresis” DEMO [1] colorfully brings to life electrophoretic separations. “Brewing with Bioreactors” utilizes bread yeast, sugar and warm water to show CO<sub>2</sub> bubbles escaping an air trap (brewing airlock) on the top of the flask. The “Thermally Speaking” DEMO [2] illustrates heat transfer concepts (conduction, convection, and radiation) using a coffee mug hot plate, a small infrared thermometer, and a variety of metal, wood, and plastic disks. Using old computer microprocessor heat sinks with fans are wonderful tools to demonstrate

the concepts of increased surface area due to fins and convection. Our Jell-O microfluidics and Paper Microfluidics DEMOs motivate discussions of photolithography, and illustrate polymer casting and colorful laminar fluid flow in channels. Our group’s final DEMO is a COMSOL Multiphysics simulation [3] illustrating electroosmotic flow with pressure driven backflow in capillary microdevices. Instructional tools to support these DEMOs are available on our website: <http://www.mderl.org/DEMOs>

The secondary value of these DEMOs include that they can

be readily adapted for middle school and high school outreach. Experimental procedures remain similar, but data collection activities can be reduced and data analysis requirements can be eliminated. Contextualizing the DEMOs within the chemical engineering applications or job functions can be useful to help students understand what chemical engineering entails. For example, for electrophoresis, I typically talk about Akzo Nobel Eka Chemicals in Columbus, MS (<https://www.akzonobel.com/eka/>) that makes pulp and paper



## International House of Chemical Engineering (IHOChE)

by Evan K. Wujcik (Lamar University)

Years

**This international session will feature presentations from:**

- ◇ Canada
- ◇ France
- ◇ Germany
- ◇ Malaysia
- ◇ Mexico
- ◇ U.S.A.

See more at:

<https://aiche.confex.com/aiche/2015/webprogram/Session30506.html>

The AIChE International Committee (lead by Said Abu-Bakr) of the Education Division will host an International House of Chemical Engineering Session at this year’s AIChE Annual Meeting in Salt Lake City, UT. This will take place on Wednesday, November 11, 2015 from 3:15-5:45pm in Alpine East of the Hilton Salt Lake City Center.

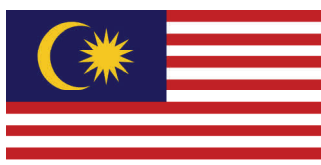
**Topics will include:**

- ◇ Tendencies of Chemical Engineering in the Last 10
- ◇ International Collaborations II

- ◇ The Use of an on-Line Peer-Review Process in the Framework of a Student Chemical Engineering Project
- ◇ Learning By Problem Design and Problem Solving: International Collaborations
- ◇ Design of Techno-Industrial Platform As Pro-Active Recruitment Approach for Biotechnology/Bioprocess Engineering Post-Graduate Students



Image used from: <http://www.mtsu.edu/intered/>



## DEMO cont.



**Figure 1:** Brewing with Bioreactors DEMo uses bakers yeast and sugar to demonstrate the growth phases of single cell organisms in bioreactors. The Erlenmeyer flask set inside the beaker introduces the concept of a jacketed reactor. The airlock can introduce discussions about contamination and also facilitates a semi-quantitative means to measure CO<sub>2</sub> production from the bioreactor. Students can also measure temperature to calculate a cooling rate.

bleaching agents via an electrocatalytic process. For bioreactors, I traditionally mention NASA's efforts to grow cells in microgravity environments ([http://er.jsc.nasa.gov/seh/cell\\_growth\\_in\\_zero\\_g.pdf](http://er.jsc.nasa.gov/seh/cell_growth_in_zero_g.pdf)) to and tie this to the futuristic need for tissues for wound repair/ other for extended space travel [https://spinoff.nasa.gov/Spinoff2011/hm\\_1.html](https://spinoff.nasa.gov/Spinoff2011/hm_1.html). Of course, converting biomass into fuels can be more familiar ([http://www.nrel.gov/learning/re\\_biofuels.html](http://www.nrel.gov/learning/re_biofuels.html)) although jet fuels generate more excitement



**Figure 3:** Students work in teams to collect data from the DEMo experiments. Everyone gets the opportunity to handle the equipment and "play" to see dependencies.

for that age group [4].

In summary, enabling students to directly observe the same concepts we teach with diagrams and equations substantially propels learning forward and increases their enthusiasm for the subject. Demonstrations do not have to yield perfect data, nor cost large amounts of money to simply illustrate dependencies. Our students sometimes lack intuition about these fundamental dependencies. DEMOs can be adapted and utilized intermittently in our chemical engineering courses to enhance understanding by augmenting other content instructional tools.

[1] A. R. Minerick and K. H. Schulz, "Freshman Chemical Engineering Experiments: Charged up on Electrophoresis & Brewing with Bioreactors \*\*\*Won award from MSU Bagley College of Engineering\*\*\*" in Chemical Engineering Division - American Society of Engineering Education Proceeding, 2005.

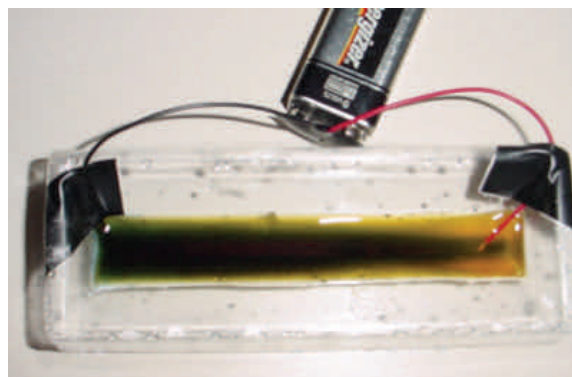
[2] A. R. Minerick, "Desktop Experiment Module: Heat Transfer," Chemical Engineering Education, vol. 44, pp. 274-279, 2010.

[3] A. R. Minerick, A. Gencoglu, J. M. Keith, M. F. Tafur, and F. A. Morrison, "Connecting Mass and Energy Balances to the Continuum Scale with COMSOL DEMOs," presented at the ASEE, Vancouver, Canada, 2011.

[4] T. N. Kalnes, M. M. McCall, and D. R. Shonnard, "Renewable Diesel and Jet-Fuel Production from Fats and Oils Thermochemical Conversion of Biomass to Liquid Fuels and Chemicals," in Thermochemical Conversion of Biomass to Liquid Fuels and Chemicals, M. Crocker, Ed., ed: Royal Society of Chemistry, 2010, pp. 468-495.

### **EDUDIV Programming Meeting**

**When: Tuesday, November 10, 2015 11:15 AM—12:15 PM**  
**Where: 252 A/B — Salt Palace Convention Center**



**Figure 2:** Charged up on Electrophoresis DEMo uses a pH indicator and salt to create a conductive solution. A 9V battery is used to deliver an electric field across the tray illustrating pH shifts due to hydrolysis reactions at the electrode. The concept of electrophoresis is reinforced as the blue color is transported down the tray. Discussion topics can include separation techniques, transport, electrochemical reactions, and catalysis (i.e. electrodes).

## **TOUR OF SALT LAKE CITY CHEVRON REFINERY**

Saturday, November 7, 2015 12-4 PM  
A bus will pick up all registrants at the Salt Lake Convention Center at noon. Please register ASAP to insure participation. More info. here: <http://www.aiche.org/conferences/aiche-annual-meeting/2015/events/salt-lake-chevron-refinery-site-tour>

For more information contact either:  
Dan Crowl [crowl@mtu.edu](mailto:crowl@mtu.edu)  
Jing Chen [jingc@aiche.org](mailto:jingc@aiche.org)

## Message from the (Newly Elected) 1st Vice Chair: Reasons to Attend the Education Division's Programming Meeting

### **Top Reasons to attend the Education Division's Programming Meeting:**

- ◆ Make New Connections
- ◆ Meet Old Friends
- ◆ Volunteer to Chair a Session
- ◆ Suggest an Innovative Session Topic

Sticking with division tradition, this short meeting will be an active learning experience with brainstorming and feedback to help craft next year's programming.

I hope to see you there.

Matthew W. Liberatore (University of Toledo)

## LITERATURE SEARCH:

## ENGINEERING EDUCATION JOURNALS

If you're new to scholarly teaching or educational research, you may not be aware of these helpful journals:

- ⇒ **Journal of Engineering Education** [[asee.org](http://asee.org)]
- ⇒ **Chemical Engineering Education** [[cee.che.ufl.edu](http://cee.che.ufl.edu)]
- ⇒ **European Journal of Engineering Education** [[sefi.be](http://sefi.be)]
- ⇒ **International Journal of Engineering Education** [[ijee.ie](http://ijee.ie)]
- ⇒ **Education for Chemical Engineers** [[icheme.org/](http://icheme.org/)]
- ⇒ **Journal of Chemical Education** [[pubs.acs.org/journal/jceda8](http://pubs.acs.org/journal/jceda8)]

### Sunday November 8, 2015

10:00am-12:00pm

"Workshop: Career Planning for Prospective Faculty" [251E (Salt Palace Convention Center)]

12:30pm-3:00pm

"Chem-E-Car Competition" [Exhibit Hall A (Salt Palace Convention Center)]

2:00pm-4:00pm

"Poster Session: Meet the Faculty Candidate" [Exhibit Hall I (Salt Palace Convention Center)]

3:30pm-6:00pm

"Apps in Chemical Engineering" [250F (Salt Palace Convention Center)]

"Research Experiences for Undergraduates" [251F (Salt Palace Convention Center)]

5:30pm-7:00pm

"Workshop: Effective Teaching for New or Prospective Faculty" [251E (Salt Palace Convention Center)]

### Monday November 9, 2015

8:30am-11:00am

"Department Building and Scholarship in Chemical Engineering: A Session in Honor of Gary Leal, the 2014 Recipient of the Warren K. Lewis Award" [Alpine West (Hilton Salt Lake City Center)]

"Undergraduate Process Safety" [Alpine East (Hilton Salt Lake City Center)]

8:30am-11:30am

"Student Design Competition" [150A/B (Salt Palace Convention Center)]

"Student Paper Competition" [250B (Salt Palace Convention Center)]

10:00am-12:30pm

"Undergraduate Student Poster Sessions" [Exhibit Hall I (Salt Palace Convention Center)]

- Catalysis & Reaction Engineering
- Computing & Process Control
- Education & General Papers
- Environmental
- Food, Pharmaceutical, & Biotechnology
- Fuels, Petrochemical, & Energy
- Materials Engineering & Sciences
- Separations
- Sustainability

12:30pm-2:00pm

"Poster Presentation Success: How to Prepare and Present a Winning Poster" [155E (Salt Palace Convention Center)]

12:30pm-3:00pm

"Creative Ways to Manage Increased Enrollment: Best Practices with Large Classrooms" [Alpine West (Hilton Salt Lake City Center)]

"NSF Workshop I" [Grand Ballroom A (Hilton Salt Lake City Center)]

2:00pm-3:00pm

"Getting Your Research Published" [155E (Salt Palace Convention Center)]

3:15pm-5:45pm

"Finding Your Niche in Chemical Engineering" [150A/B (Salt Palace Convention Center)]

"NSF Workshop II" [Grand Ballroom A (Hilton Salt Lake City Center)]

"Workshop: Preparing E-Learning Materials" [Alpine East (Hilton Salt Lake City Center)]

### Tuesday November 10, 2015

8:30am-11:00am

"Best Practices in Preparing Engineering Education Publications" [Alpine West (Hilton Salt Lake City Center)]

"Free Forum on Engineering Education: The First Year and Sophomore Year" [Alpine East (Hilton Salt Lake City Center)]

12:30pm-3:00pm

"ABET Accreditation: Best Practices" [Alpine West (Hilton Salt Lake City Center)]

"Free Forum on Engineering Education: Junior and Senior Years" [Alpine East (Hilton Salt Lake City Center)]

3:15pm-5:45pm

"ABET Accreditation: Insights and Updates" [Alpine West (Hilton Salt Lake City Center)]

"Poster Session: Chemical Engineering Education" [Exhibit Hall I (Salt Palace Convention Center)]

### Wednesday November 11, 2015

8:30am-11:00am

"Best Practices of Online Courses and Virtual Environments" [Alpine West (Hilton Salt Lake City Center)]

"Young Faculty Forum" [Alpine East (Hilton Salt Lake City Center)]

12:30pm-3:00pm

"Best Practices for Teaching Computational Tools and Assessment" [Alpine East (Hilton Salt Lake City Center)]

"Embracing Maker Space for ChE—3-D Printing, Etc." [Alpine West (Hilton Salt Lake City Center)]

3:15pm-5:45pm

"International House of ChE's" [Alpine East (Hilton Salt Lake City Center)]

"Survey Results and Best Practices: Process Control" [Alpine West (Hilton Salt Lake City Center)]

### Thursday November 12, 2015

8:30am-11:00am

"Department Heads Forum (Invited Talks)" [Alpine West (Hilton Salt Lake City Center)]

"Workshop: Process Safety Integration into the Undergraduate Laboratories" [Alpine East (Hilton Salt Lake City Center)]

**Also listed online at: <https://aiche.confex.com/aiche/2015/webprogram/04.html>**



# 2015 AIChE Annual Meeting in Salt Lake City Overview

—by **Evan K. Wujcik (Lamar University)**



The 2015 group 4 Technical Program will include 22 sponsored or co-sponsored technical sessions, 6 workshops, and 12 poster sessions...as well as the Chem-E-Car Competition, Student Design Competition, and Student Paper Competition.

## Workshops will include:

- \* Career Planning for Prospective Faculty
- \* Effective Teaching for New or Prospective Faculty
- \* NSF Workshops I & II
- \* Preparing E-Learning Materials
- \* Process Safety Integration into the Undergraduate Laboratories

## Poster Sessions will include:

- \* Meet the Faculty Candidate
- \* Chemical Engineering Education
- \* and a number of simultaneous Undergraduate Poster Sessions with the following topics...
  - \* Catalysis and Reaction Engineering
  - \* Chemical Engineering Educations
  - \* Computing and Process Control
  - \* Education and General Papers
  - \* Environmental
  - \* Food, Pharmaceutical, and Biotechnology
  - \* Fuels, Petrochemicals, and Energy

Don't forget to download the 2015 Annual Meeting App to your smartphone or smart-device for the complete technical program.

- \* Materials Engineering and Sciences
- \* Separations
- \* Sustainability

The ABET Accreditation sessions “Best Practices” and “Accreditation: Insights and Updates” will also be featured, which will focus on recent issues in ABET accreditation, as well as resources, and strategies for a successful ABET review.

The Student Design Competition will take place on Monday Morning, and, as always, the Chem-E Car Competition will take place Sunday afternoon. The Student Paper Competition will also be on Monday morning, and will include a variety of topics from tissue engineering to membrane reactors.

The “Research Experiences for Undergraduates” session will feature talks on Providing the Whole Perspective for the Team Process through an REU and Coordination Between Multiple REU Sites.

Sessions involving process and safety will include “Undergraduate Process Safety,”—which will look at both academic and industrial safety—as well as “Survey Results and Best Practices: Process Control”—looking at the development, implementation, and assessment of Process Control Education.

The Department Building and Scholarship in ChE: A session in Honor of Gary Leal, the 2014 Recipient of the Warren K. Lewis Award will include a number of invited talks ranging from academic start-ups to fluid mechanics.

## Other sessions include:

- \* Apps in Chemical Engineering
- \* Getting your Research Published
- \* Poster Presentation Success: How to Prepare and Present a Winning Poster
- \* Best Practices:
  - \* Preparing Engineering Education Publications
  - \* Teaching and Computational Tools and Assessment
  - \* Online Courses and Virtual Environments
  - \* Large Classes
- \* Embracing Maker Space for ChE—3D Printing, Etc.
- \* International House of ChE (see p. 4)
- \* Finding you Niche in Chemical Engineering

## as well as forums centered around:

- \* Engineering Education in the First and Sophomore Years
- \* Engineering Education in the Junior and Senior Years
- \* Young Faculty
- \* Department Heads

We look forward to seeing you in Salt Lake City! Remember, if you have suggestions for a particular session for an upcoming AIChE conference or would just like to become more involved (perhaps even becoming a session chair), please attend the:

**Have a great meeting...see you there!**



**ChemEDU News: A Publication  
of the AICHE Education Division**

**Education Division Leadership**

**Chair (2013-2015)**

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**Director (2012-2015)**

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**Director (2013-2016)**

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**1st Vice Chair & Program Chair (2013-2015)**

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**Secretary-Treasurer (2010-2016)**

**Benjamin Davis**  
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**Director (2014-2017)**

**Norman Loney**  
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**Past Chair (2013-2015)**

**Donald P. Visco**  
The University of Akron  
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(330) 972-7930

The Education Division (chartered: 2009) promotes the education of chemical engineers as it pertains to educational research, scholarly teaching, and applications to include the broader endeavors which encompass education, such as those which are part of the Division's programming commitment.

***The objectives of the Division are to:***

- *Provide the focal point for AICHE members with interests in educational methods and their assessment, the scholarship of education including both practice and theory as well as outreach activities regarding chemical engineering education.*
- *Develop a relevant technical program in education for meetings within the assigned programming areas through discussion with the Committees of the Institute*
- *Encourage chemical engineering educators to strengthen their own learning in the field of engineering education and on the development of appropriate curricular material focused for the ever-diversifying field of chemical engineering.*
- *Coordinate and actively work with other entities within the Institute, in particular CEOC and its Committees, as well as other entities external to the Institute (such as ASEE, industry, government agencies, etc.) to foster the goals of the Division and the Institute as they relate to education.*
- *Recognize educational achievements of AICHE members through awards and honors.*
- *Provide a high-profile home for programming and activities related to educational research and teaching within the chemical engineering community performed by Institute members.*
- *Encourage, through programming and other activities, the training of chemical engineering graduate students in chemical engineering educational methods.*
- *Provide feedback and information to the Board, Councils and Committees of the Institute on education-related issues, on request.*

The Division is governed by its [Bylaws](#) and its [Board](#).

Have ideas that just don't fit a traditional journal article? Do you believe others will benefit from your opinion and insight? Consider submitting your short-form article to ChemEDU News. We'll consider research letters, opinion columns, teaching tips, course suggestions—anything of interest to ChE Educators. Articles will be editorially reviewed and may be referred, with the author's permission, to *Chemical Engineering Education* for consideration as an article according to their existing guidelines and standards.

Please send all solicitations to the Chair (Jason M. Keith) or directly to the

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