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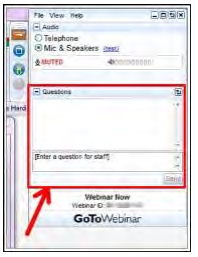
Have Questions?



Type them into questions box!

"Why am I muted?"
Don't worry. Everyone is muted except the presenter and host. Thank you and enjoy the show.

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Why does food taste better when it is grilled or what molecular compounds make a great wine? Discover the delectable science of your favorite food and drink and don't forget to come back for a second helping.

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- Find a job
- Effectively use research tools like SciFinder® and ACS ChemWorx
- Communicate your science
- Write grant proposals
- Build industry partnerships
- Prepare for a changing employment landscape

http://acsoncampus.acs.org

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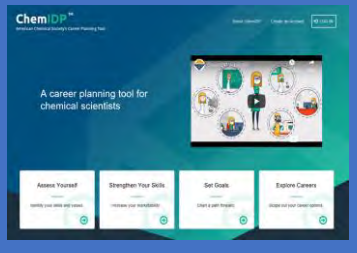

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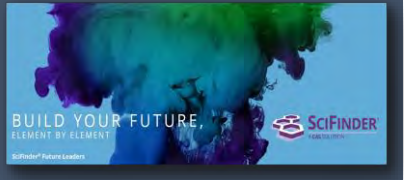

171 alumni, 35 countries and over 120 institutions

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ACS Efforts and Resources on COVID-19

Browse **ACS Resources** and **Initiatives!**

- **YOU MAY RECEIVE A ONE-YEAR WAIVER ON YOUR NATIONAL DUES** If your membership is up for renewal, but you're experiencing a special hardship, such as unemployment, furlough, reduced wages or illness.
- **RECEIVE ACCESS TO LINKEDIN LEARNING THROUGH THE END OF THIS YEAR** This powerful resource includes over 15,000 on-demand courses to support your continued learning and career advancement for active ACS members.
- **INOVA EAP/WORK-LIFE ASSISTANCE PROGRAM** 24/7 assistance on a wide range of issues, such as emotional, relationship, major life, health, wellness, educational and more for ACS members based in the United States. Confidential services are provided via telephone or comprehensive online resources.

www.acs.org/covid-19

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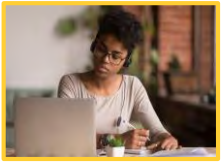
ACS Career Navigator:
Your Home for Career Services

Whether you are just starting your journey, transitioning jobs, or looking to brush up or learn new skills, the **ACS Career Navigator** has the resources to point you in the right direction.

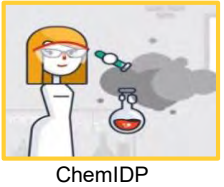
We have a collection of career resources to support you during this global pandemic:


Professional Education


Virtual Career Consultants

ACS Leadership Development System


Career Navigator LIVE!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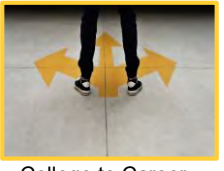
College to Career

ACS Webinars

Virtual Classrooms

Visit www.ACS.org/COVID19-Network to learn more!

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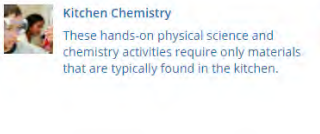
Explore ACS Education

Promoting excellence in science education and community outreach!



https://www.acs.org/content/acs/en/education.html

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Free Upcoming ACS Webinars!

Thursday, July 23, 2020 at 2-3pm ET
Speakers: Steve Lee, Stanford University / Cynthia Fuhrmann, UMass Medical School
Moderator: Corrie Kuniyoshi, American Chemical Society

Register for Free!

What You Will Learn

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Co-produced with: ACS Career Navigator

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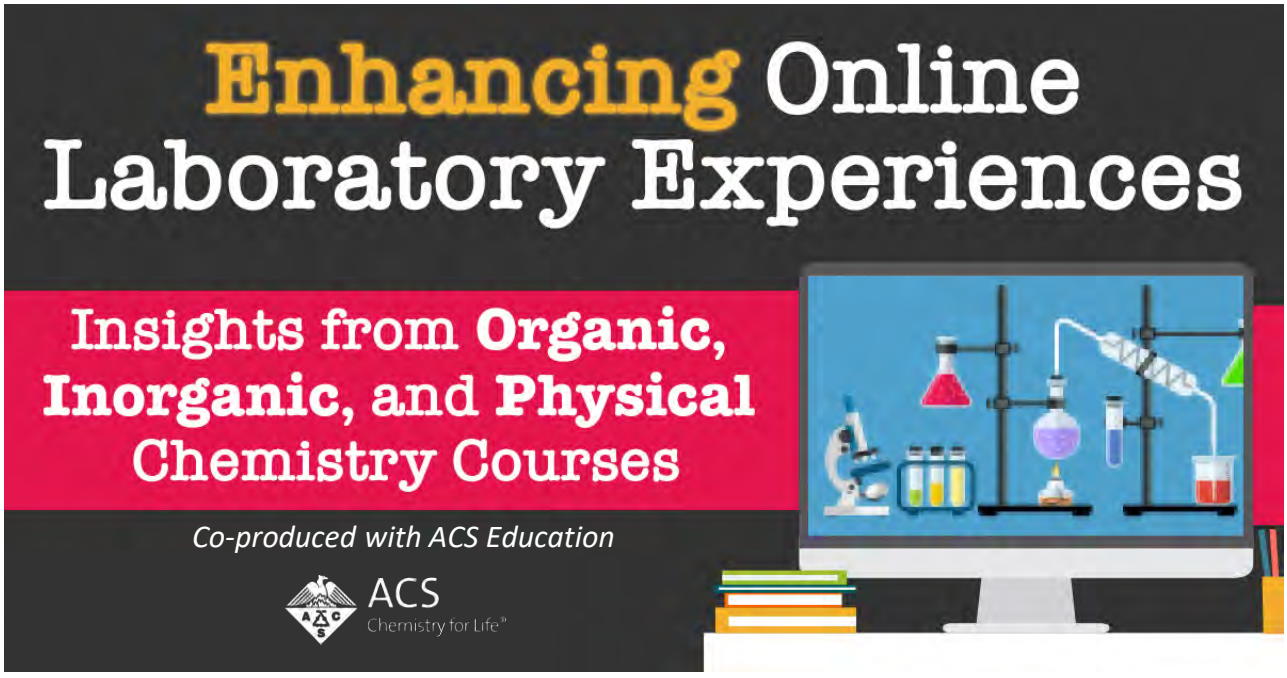

THIS ACS WEBINAR WILL BEGIN SHORTLY...

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Enhancing Online Laboratory Experiences: Insights from Organic, Inorganic, and Physical Chemistry Courses

Stacey Lowery Bretz
University Distinguished Professor,
Miami University

Maria Gallardo-Williams
Teaching Professor and Director, Organic Teaching Laboratories,
North Carolina State University

Kyle Grice
Associate Professor of Inorganic Chemistry,
DePaul University

Michael Seery
Professor of Chemistry Education,
University of Edinburgh

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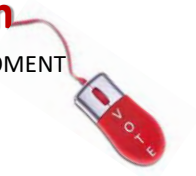
Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT



What is the highest degree offered at your institution?

- Associate's degree
- Bachelor's degree
- Master's degree
- Doctoral degree
- Not applicable

** If your answer differs greatly from the choices above tell us in the chat!*

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Disclaimer

The opinions or views expressed in these discussions do not necessarily reflect on the current statements and guidelines of the American Chemical Society, the views or opinions of ACS's management or its members, or plans for renewed or revised policies. Chemistry departments seeking ACS Approval must continue to follow the ACS Guidelines for Bachelor's Degree Programs as stipulated by the Committee on Professional Training, including those for laboratory instruction once their campuses resume face-to-face instruction without social distancing.

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What You Will Learn

- Various goals and outcomes for online undergraduate laboratory experiences
- Examples of how laboratory goals and outcomes are being fulfilled
- Approaches for planning and assessing online laboratory experiences

16

Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT

What types of undergraduate laboratories do you teach?

(select all that apply)

- Organic chemistry
- Inorganic chemistry
- Physical chemistry
- Other (tell us more in the chat)
- Not applicable

** If your answer differs greatly from the choices above tell us in the chat!*

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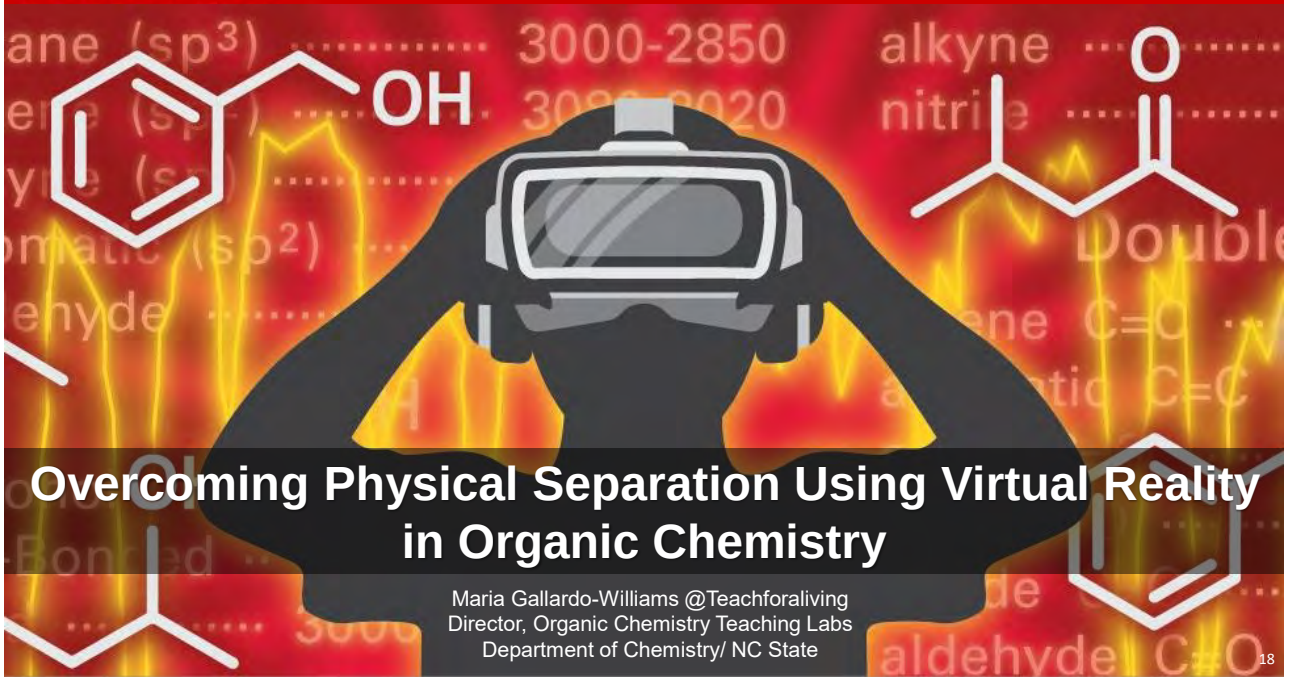
NC STATE UNIVERSITY



Overcoming Physical Separation Using Virtual Reality in Organic Chemistry

Maria Gallardo-Williams @Teachforaliving
Director, Organic Chemistry Teaching Labs
Department of Chemistry/ NC State

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Why did we create VR labs?

Motivated by accessibility concerns

- Pregnant students
- Deployed military
- Visually impaired students

Informed by learning objectives

Pre-Production: Flowcharts

Production: 360 Video Shoot

21

Post Production: User Interaction Design

S04: Lab Station - Procedure (AfterEffects Scene 05)

In today's lab, we will perform a microscale distillation using a Hickman still head. The distillation apparatus includes: a ring stand with two small clamps, a hot plate, an aluminum heating block, a clean and dry 5-millilitre conical vial with screw cap, boiling chips, a Hickman still head with a one-hole septum and screw cap, and a digital thermometer.

Addtional equipment includes: 1.0 millilitre of 2-methylcyclohexanol 2 millitre of 85% phosphoric acid, anhydrous sodium sulfate (Na_2SO_4), a spatula two long-stemmed Pasteur Pipets two clean test tubes and a test tube holder

Graphics (fade in & disappear in time with voiceover):
Have labels appear above the items listed (See example from Lab 1: Scene 7)

Place the aluminum block on top of the hot plate. Add 2 or 3 boiling chips to the conical vial.

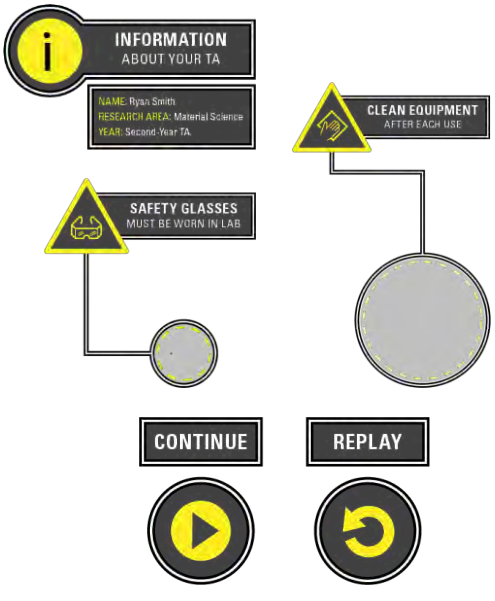
Place the 5-millilitre conical vial in one of the openings of the aluminum block.

Add 1.0 millilitres of 2-methylcyclohexanol.

Add 2 millilitres of 85% phosphoric acid.

Graphics (Fade in):

WARNING ICON: "**Concentrated acids are corrosive Always wash hands after use**" (See example below)



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Evaluation

CH 222 Virtual Organic Chemistry Lab Pilot, May 2018
Presented results at ELI 2019 and ACS Orlando 2019

Measure	Traditional lab mean	VR lab mean
Short term (Lab report)	66.6 ± 17.9	61.4 ± 23.4
2-week recall (Quiz)	51.2 ± 23.9	54.0 ± 23.6

The two methods are virtually indistinguishable in terms of student outcomes, even though the VR experience might have been more memorable than a face-to-face lab.

Production and Evaluation of a Realistic Immersive Virtual Reality Organic Chemistry Laboratory Experience: Infrared Spectroscopy
Cathi L. Dunnagan, Devran A. Dannenberg, Michael P. Cuales, Arthur D. Earnest, Richard M. Gurnsey, and Maria T. Gallardo-Williams. J. Chem. Educ. 2020, 97, 258−262.

Student Testimonials

"I feel that the virtual environment has the functioning abilities to give me the same information a real class would give me. **The virtual experience takes out waiting times during experiments** as well as makes it **very straightforward** and to the point. It also explains **step by step** what to do **one on one** which is hard to get in a real class."

"It allowed me a **very detailed explaination of why the correct answer was in fact the correct answer** unlike a real class environment where you aren't sure if you are ever doing it correctly."

"I like that we still went through **like a normal lab in a normal setting**. I liked the **image and explanations** associated with the answers and activities."

"I've never had a TA talk to me for such a long time."

NC STATE UNIVERSITY

Sharing with others

https://sites.google.com/ncsu.edu/ncstatevrorganicchemistrylabs/home

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Lessons from a Rapid Pivot to Teaching Inorganic Lab Fully Online in SQ2020

Kyle Grice
kgrice1@depaul.edu
DePaul University
Twitter: @GriceChemistry

Based on the July 7 SLiThEr
(Supporting Learning with Interactive Teaching: a Hosted Engaging Roundtable)
hosted by IONiC (Interactive Online Network of Inorganic Chemists)

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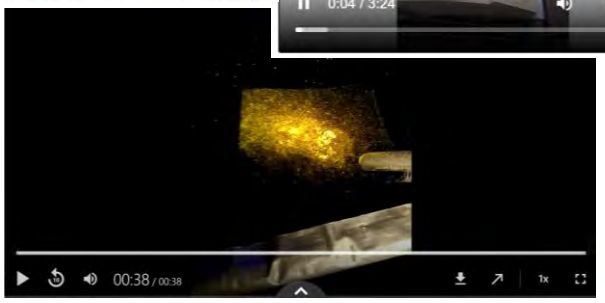
Fully Online SQ2020

- DePaul is on the quarter system and the timing of the shutdown meant spring quarter was fully online
- CHE 321 is a junior/senior-level inorganic chemistry lab. Normally we have **5 multi-week lab experiments**
- In SQ2020 I taught it asynchronously, fully online with very little time to prepare.
- I had 21 students, more than I usually have (14-16)

Goals

- Keep the students engaged in the course and keep communication open
- Give the students a "lab experience"
- Keep the lab report writing expectations and help the students

Moving Labs Online



- Took short videos (a few minutes) and pictures
- Posted raw data (masses and volumes) and let the students do the processing
- Spectral data were saved as pdf or excel files (student's computers may not be able to run software that isn't Microsoft Office, etc)
- Rubric and info on lab report writing were given out, and there was an assignment on writing early on

Some Lessons From My Experience

- Keep all links and info centralized on a main page for each lab. Link out to submission folders and discussion posts, etc.
- Be clear and redundant with info in your Course Management Site and your email communications, particularly due dates.
- Keep students engaged between big assignments with **small, low-stakes assignments**: multiple choice quizzes, discussion board posts (require post and response each week, always due on the same day and time each week)
- Be flexible and supportive. For example, allow students to revise lab reports based on feedback.
- Do the big assignments have to be lab reports? What about presentations? Posters?

Thoughts on moving a physical chemistry lab online

Michael Seery
Professor of Chemistry Education & Director of Teaching
Editor in Chief, *Chemistry Education Research and Practice*

michael.seery@ed.ac.uk @seerymk

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School of Chemistry

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Overview of presentation

Considering what we can get from "online labs"

Designing a physical chemistry "lab"

Notes about my context:

- We are still in *planning* mode!
- All my students are Chemistry Majors

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What learning can occur in online labs?

In

Awareness of practical approaches and their rationale

Using chemical knowledge to apply to problem solving

Experimental design

Group work and data compilation

Seery, M. K. (2020). Establishing the Laboratory as the Place to Learn How to Do Chemistry. *Journal of Chemical Education*, **97(6)**, 1511–1514

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In

Awareness of practical approaches and their rationale

Using chemical knowledge to apply to problem solving

Experimental design

Group work and data compilation

Out

Practical experience

Technical competence development

Seery, M. K. (2020). Establishing the Laboratory as the Place to Learn How to Do Chemistry. *Journal of Chemical Education*, **97(6)**, 1511–1514

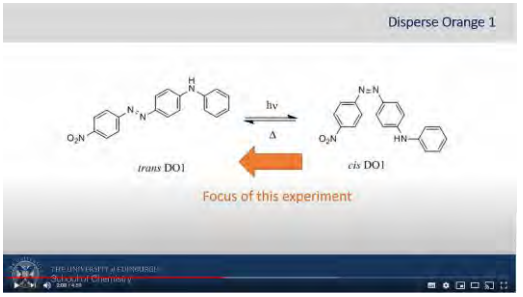
Design (physical chemistry)
Phase 1: Preparation

Preparation 1

Experimental Guidance: to familiarise students with an experimental approach (for the purpose of its utility)

Preparation 2

Supporting information: to provide students with meaningful information that they can use in planning their experimental design

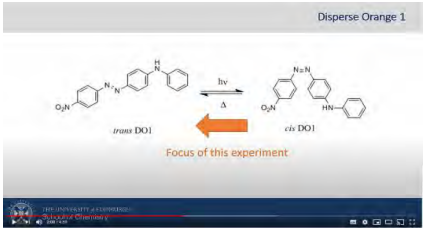


Videos for lots of (phys chem) labs at: youtube.com/mkseery
I like preparation! See: Agustian, H. Y., & Seery, M. K. (2017). Reasserting the role of pre-laboratory activities in chemistry education: a proposed framework for their design. *Chemistry Education Research and Practice*, 18(4), 518-532.

Design (physical chemistry)
Phase 2: Activity

Group Task

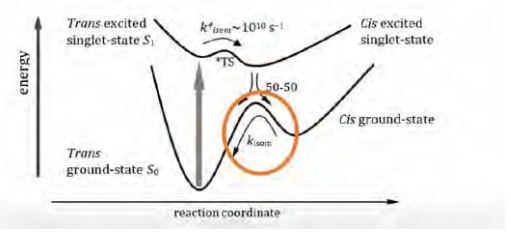
Based on information provided, students need to prepare a procedure to achieve a given task (literature based)
Guided by teaching assistants, students provided with data based on their task



"*Explore temperature or pH or solvent dependence*"

Group Report

Students assigned to larger than usual groups (e.g. ~6) and have to pull together their various data components to produce a combined report to address given task.



Based on principles discussed in:
Seery, M. K., Jones, A. B., Kew, W., & Mein, T. (2018). Unfinished recipes: Structuring upper-division laboratory work to scaffold experimental design skills. *Journal of Chemical Education*, 96(1), 53-59.

JOURNAL OF CHEMICAL EDUCATION

ACS Chemistry for Life®

Available Now! In support of educators keeping their students' chemistry education moving forward ACS Publications & the ACS Division of Chemical Education are sharing a collection of free to read articles from the Journal of Chemical Education.

Coming in September 2020!

Available Now! Laboratory teaching continues to evolve and face new challenges in today's world. To help share the broad approaches to laboratory education, the journal has provided a collective resource of articles on laboratory learning and understanding, inquiry methods, student preparedness, assessing the lab, and faculty goals and professional development for laboratory teaching.

https://pubs.acs.org/journal/jceda8

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ACS Education Webinar Recordings

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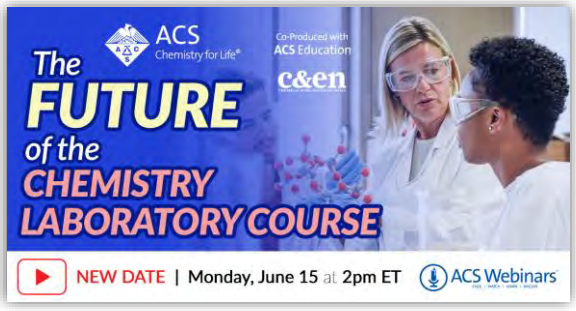
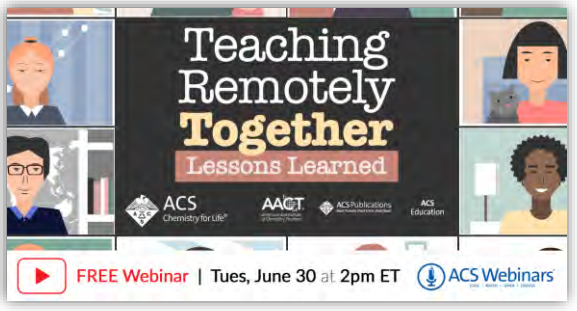


https://www.acs.org/content/acs/en/acs-webinars/popular-chemistry/future-lab.html



https://www.acs.org/content/acs/en/acs-webinars/popular-chemistry/teaching-remote.html

The chemistry community has a wide range of resources to assist with teaching remotely in various and changing circumstances which are organized into six categories. Be sure to view this free resource!
http://www.acs.org/content/dam/acsorg/events/popular-chemistry/Slides/2020-06-30-remote-teaching-resources.pdf

www.acs.org/acswebinars

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Panel Resources

Visit these websites and read these articles for more information about the courses, approaches, and assessments presented during this ACS Webinar.

Maria Gallardo-Williams, Teaching Professor and Director, Organic Teaching Laboratories, North Carolina State University

- North Carolina State University Virtual Reality Organic Chemistry Labs: go.ncsu.edu/vrlabs-orgchem
- Dunnagan, C. L.; Dannenberg, D. A.; Cuales, M. P.; Earnest, A. D.; Gurnsey, R. M.; Gallardo-Williams, M. T. Production and evaluation of a realistic immersive virtual reality organic chemistry laboratory experience: Infrared spectroscopy. *J. Chem. Educ.* **2020**, *97(1)*, 258−262. DOI: 10.1021/acs.jchemed.9b00705

Kyle Grice, Associate Professor of Inorganic Chemistry, DePaul University

- July 7, 2020 Supporting Learning with Interactive Teaching: a Hosted Engaging Roundtable (SLiThEr): hosted by the Interactive Online Network of Inorganic Chemists (IONiC): https://www.ionicviper.org/
- Nataro, C; Johnson, A. R. A community springs to action to enable virtual laboratory instruction, *Journal of Chemical Education,* **Article ASAP**. DOI: 10.1021/acs.jchemed.0c00526

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- Agustian, H. Y.; Seery, M. K. Reasserting the role of pre-laboratory activities in chemistry education: a proposed framework for their design. *Chemistry Education Research and Practice*, **2017**, *18(4)*, 518-532. DIO: 10.1039/C7RP00140A
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http://www.acs.org/content/dam/acsorg/events/popular-chemistry/Slides/2020-07-22-resources.pdf

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University Distinguished Professor,
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Speakers: Steve Lee, Stanford University / Cynthia Fuhrmann, UMass Medical School
Moderator: Corrie Kuniyoshi, American Chemical Society

Register for Free!

What You Will Learn

- Basics of Individual Development Plans and an introduction to ChemIDP.org
- Importance, challenges, and resources to grow in your self-awareness
- Discovering patterns where you succeed and thrive

Co-produced with: ACS Graduate & Postdoctoral Scholars Office

Friday, July 24, 2020 at 2-3pm ET
Speaker: Ajay Yekkirala, Blue Therapeutics
Moderator: Jane Aldrich, University of Florida

Register for Free!

What You Will Learn

- What are the stats, scientific issues, and policy ramifications driving the opioid crisis
- What are the body's pain pathways and where are the potential clinical targets
- What solutions are medicinal chemists working on

Co-produced with: ACS Division of Medicinal Chemistry

Wednesday, July 29, 2020 at 2-3pm ET
Speaker: Brian Getson, Getson & Schatz, P.C.

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What You Will Learn

- How to time the filing of your green card application
- How to maximize your chances of approval in the EB-1/NIW categories
- Why you should not worry about Trump's June 2020 order

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