Welcome to the New Faculty Workshop

Have you watched the video yet:? At youtube.com, it is ZTv2HR2ckto

#ChemNFW2019

Being a new faculty member

Help in overcoming barriers to success

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Oh crap.
While Waterman was talking, I was wondering if they can make a decent Atlantic Breeze at the bar…

Three jobs

Leader (latest birthday in the year)
keep group on task & insures all voices are heard.

Recorder (mid-year birthday)
gets the ideas down and organized

Reporter (earliest birthday)
presents ideas

Three tasks

1. Five barriers to success for junior faculty
2. How is each thing a barrier
3. Identify one approach to how you personally will work to overcome one of these barriers.

New Faculty Workshop
Workshop Agenda

October 18-19, 2019
Hyatt Regency Savannah • 2 W. Bay Street • Savannah, GA 31401

All sessions held in the Verelst Percival room unless otherwise noted

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2:30-3:00 pm	Workshop Check-In near Verelst Percival (refreshments available)
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Teaching vs. Learning

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Difference between teaching and learning

"I taught them that"

"I think it's an exaggeration, but that there's a lot of truth in saying that when you go to school, the trauma is that you must stop learning and you must now accept being taught."

— Seymour Papert

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What happens in college-level science classes?

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A disconnect in education

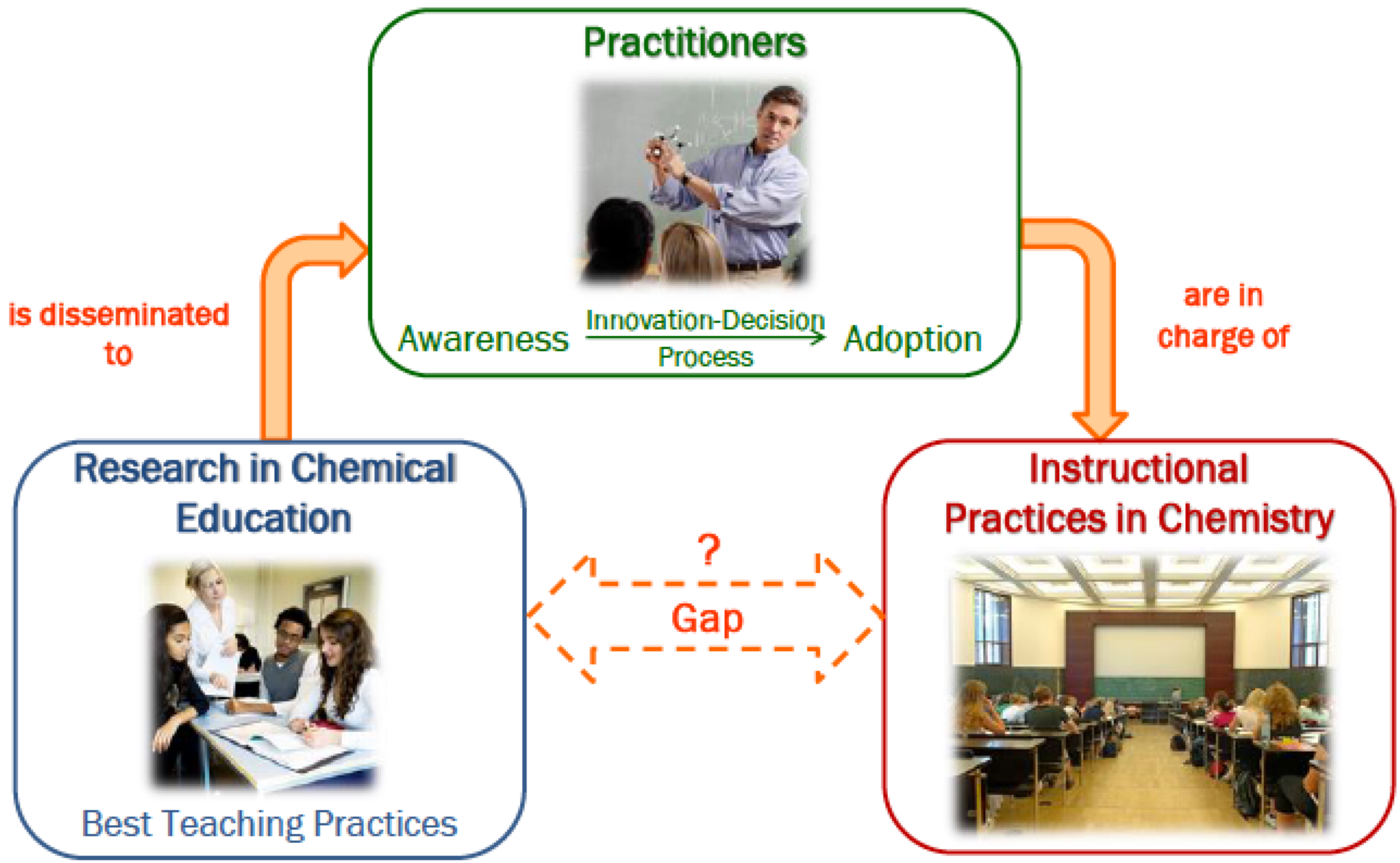

Image courtesy of Marilyne Stains, UNL

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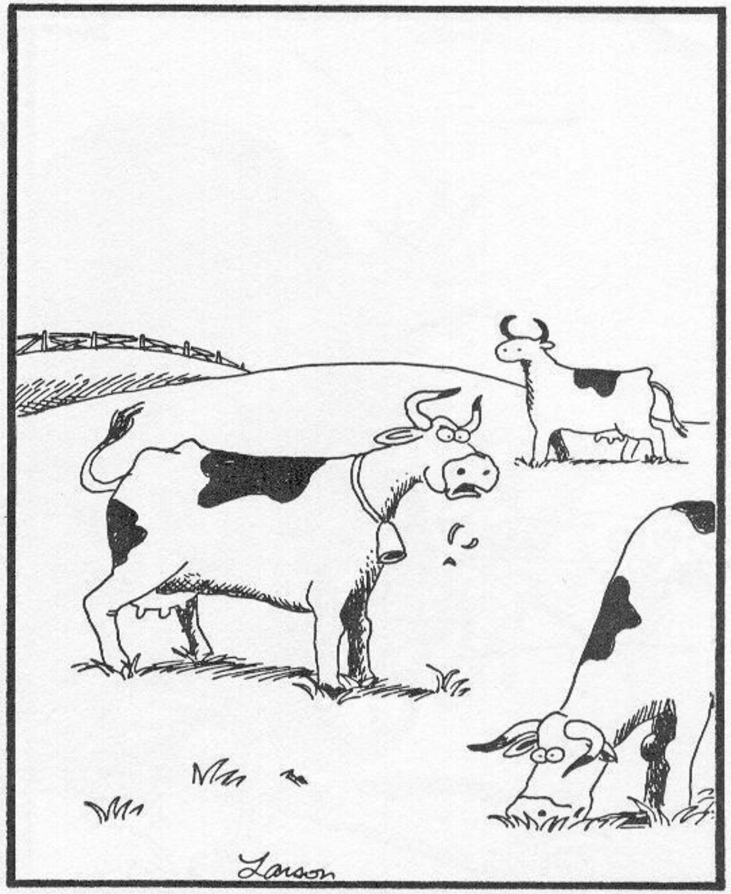
Please, sir, lecture at us more…



"Hey, wait a minute! This is grass! We've been eating grass!"

Valerie Strauss: "It puts kids to sleep — but teachers keep lecturing anyway. Here's what to do about it" *Washington Post* July 11, 2017.

Times Higher Education
(David Mathews: July 6, 2017)

"Anthropologist offers explanation for why faculty members hesitate to adopt innovative teaching methods."

Fear of looking stupid

Image: Gary Larson

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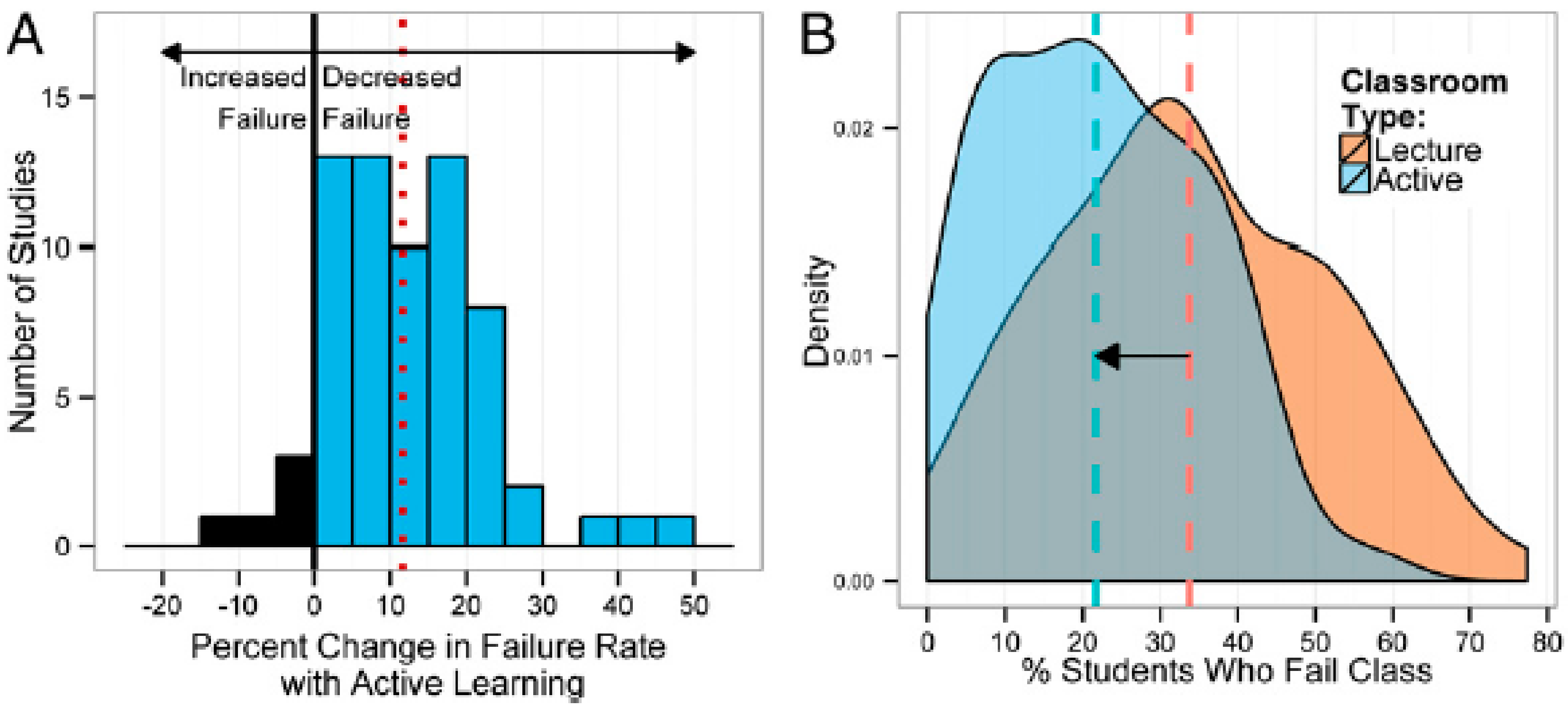
What does "active learning" mean?

… this is a lot like what happens in *research*

A lot of data on the practice



Freeman S., et al. *PNAS* **2014**, 111, 8410.

Students in all disciplines benefit from more active learning

Here's **the** rub, part 1

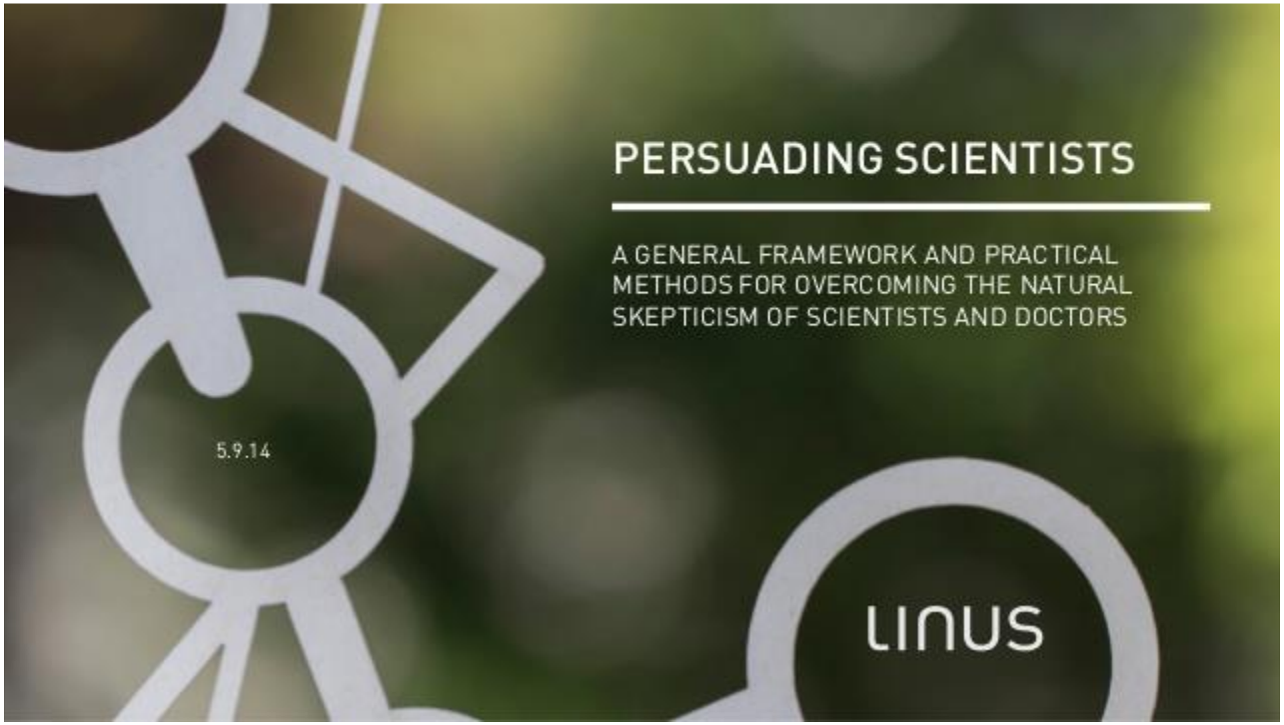


Image from: Intelligent Content Conference via slideshare.net

Students in all disciplines benefit from more active learning,
yet chemists often don't believe the data
or practice according to that data.

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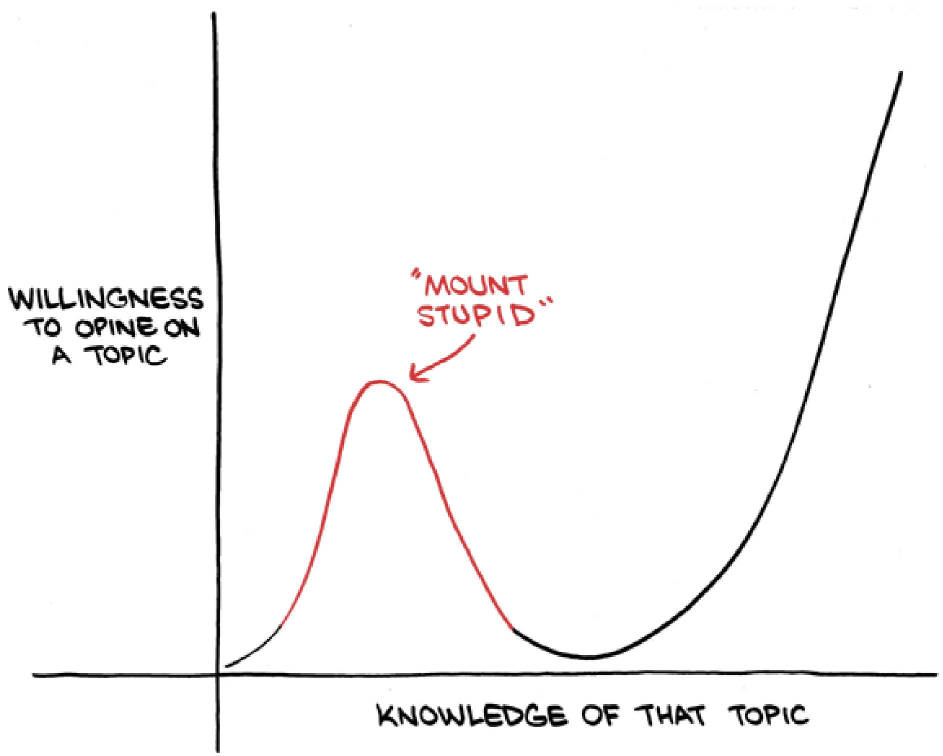
Solution to that problem:

"No, It's Not Your Opinion. You're Just Wrong."

Jef Rouner *Houston Press*, July 24, 2015.



Dunning–Kruger effect

Image: smb-comics.com

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Here's the rub, part 2

Image: AFP

New **faculty** teach ***defensively***…to avoid student complaints.

Boice, R. *The New Faculty Member*, San Francisco: Jossey-Bass, 1992.

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A note on student evaluations

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Boice, R. *The New Faculty Member*, San Francisco: Jossey-Bass, 1992.

Studies in Educational Evaluation

Volume 54, September 2017, Pages 22-42

Meta-analysis of faculty's teaching effectiveness: Student evaluation of teaching ratings and student learning are not related

Bob Uttl, Carmela A. White [1], Daniela Wong Gonzalez [2]

⊞ Show more

https://doi.org/10.1016/j.stueduc.2016.08.007

Lecturing… Comfort… Passivity…

Not learning.

On student feedback, cont'd

PNAS

Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom

Louis Deslauriers[a,1], Logan S. McCarty[a,b], Kelly Miller[c], Kristina Callaghan[a], and Greg Kestin[a]

[a]Department of Physics, Harvard University, Cambridge, MA 02138; [b]Department of Chemistry and Chemical Biology, Harvard University, Cambridge, MA 02138; and [c]School of Engineering and Applied Sciences, Harvard University, Cambridge, MA 02138

Edited by Kenneth W. Wachter, University of California, Berkeley, CA, and approved August 13, 2019 (received for review December 24, 2018)

We compared students' self-reported perception of learning with their actual learning under controlled conditions in large-enrollment introductory college physics courses taught using 1) active instruction (following best practices in the discipline) and 2) passive instruction (lectures by experienced and highly rated instructors). Both groups received identical class content and hand-outs, students were randomly assigned, and the instructor made no effort to persuade students of the benefit of either method. Students in active classrooms learned more (as would be expected based on prior research), but their perception of learning, while positive, was lower than that of their peers in passive environ-ments. This suggests that attempts to evaluate instruction based on students' perceptions of learning could inadvertently promote inferior (passive) pedagogical methods. For instance, a superstar lecturer could create such a positive feeling of learning that stu-dents would choose those lectures over active learning. Most im-portantly, these results suggest that when students experience the increased cognitive effort associated with active learning, they initially take that effort to signify poorer learning. That disconnect

with the material. There is nothing known about how students naturally react to active learning without any promotion from the instructor. In addition, previous studies used different course materials for active versus passive instruction, potentially con-founding the effect of pedagogy with that of course materials.

In this report, we identify an inherent student bias against active learning that can limit its effectiveness and may hinder the wide adoption of these methods. Compared with students in traditional lectures, students in active classes perceived that they learned less, while in reality they learned more. Students rated the quality of instruction in passive lectures more highly, and they expressed a preference to have "all of their physics classes taught this way," even though their scores on independent tests of learning were lower than those in actively taught classrooms. These findings are consistent with the observations that novices in a subject are poor judges of their own competence (27–29), and the cognitive fluency of lectures can be misleading (30, 31). Our findings also suggest that novice students may not accurately assess the changes in their own learning that follow from their

APPLIED PHYSICAL SCIENCES

Self-report does not indicate learning.

Solution to defensive teaching:

Lots of help

Campus teaching centers

Respected teachers

Your peers (starting here)

Us

Leverage what you know already

Active Learning:

- Engagement
- Collaboration
- Student control
- Direct problem relevance
- Personalization and differentiation
- Direct and personal challenges
- Communication

Success in Research:

- Engagement
- Collaboration
- Student independence and agency
- Direct problem relevance of concepts and techniques
- Personalization and differentiation
- Direct and personal challenges
- Communication of results

You already know how to do this stuff.

This is your training. You are going to be awesome, and your students will **learn**, if you use your native and developed skill set in a "teaching" environment.

Outline for teaching session

Defining some terms

- Discipline-based education research (DBER)
  - Evidence-based teaching methods (EBTMs)
  - Research-based instructional practices (RBIPs)
- Active learning
- Student-centered teaching

What are the EBTMs – PCAST Report

Table 2. Types of active learning that have been demonstrated to enhance learning.

Types of active learning with feedback	Examples of studies that demonstrate enhanced learning
Small group discussion and peer instruction	Anderson et al. (2005); Armbruster et al. (2009); Armstrong et al. (2007); Beichner et al. (1999); Born et al. (2002); Crouch and Mazur (2001); Fagen (2002); Lasry et al. (2008); Lewis and Lewis (2005); McDaniel (2007a, 2007b); Rivard and Straw (2000); Tessier (2004 and 2007); Tien et al. (2002)
Testing	Steele (2003)
One-minute papers	Almer et al. (1998); Chizmar and Ostrosky (1998); Rivard and Straw (2000)
Clickers	Smith et al. (2009, 2011)
Problem-based learning	Capon and Kuhn (2004); Preszler et al. (2007)
Case Studies	Preszler (2009)
Analytical challenge before lecture	Schwartz and Bransford (1998)
Group tests	Cortright et al. (2003); Klappa (2009)
Problem sets in groups	Cortright et al. (2005)
Concept mapping	Foncesca et al. (2004); Prezler (2004); Yarden et al. (2004)
Writing with peer review	Pelaez (2002)
Computer simulations and games	Harris et al. (2009); McDaniel et al. (2007); Traver et al. (2001)
Combination of active learning methods	Freeman et al. (2007); O'Sullivan and Cooper (2003)

Note: All studies cited compare treatment and control groups. Full references are found in Appendix I.

Presidents Council of Advisors Science and Technology (PCAST)
2012 PCAST Report - Engage to Excel

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How to make it work for everyone (including you)

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Examples of EBIPs

Case Studies
Clickers
Collaborative Learning
Concept Inventory
Cooperative Learning
Computer Simulations
Concept Maps
Formative Assessment
Interactive Lecture Demonstration
Just-in-Time Teaching
Peer Instruction
Process Oriented Guided Inquiry Learning (POGIL)
Problem-Based Learning (PBL)
Think-Pair-Share
Student Assessment of their Learning Gains (SALG)
SCALE-UP

WE HAVE A PLAN

Supply some background

Give you practice → Teachable Tidbit

Provide some feedback

Build your network

Image: Chris Houghton

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ACS Chemistry for Life

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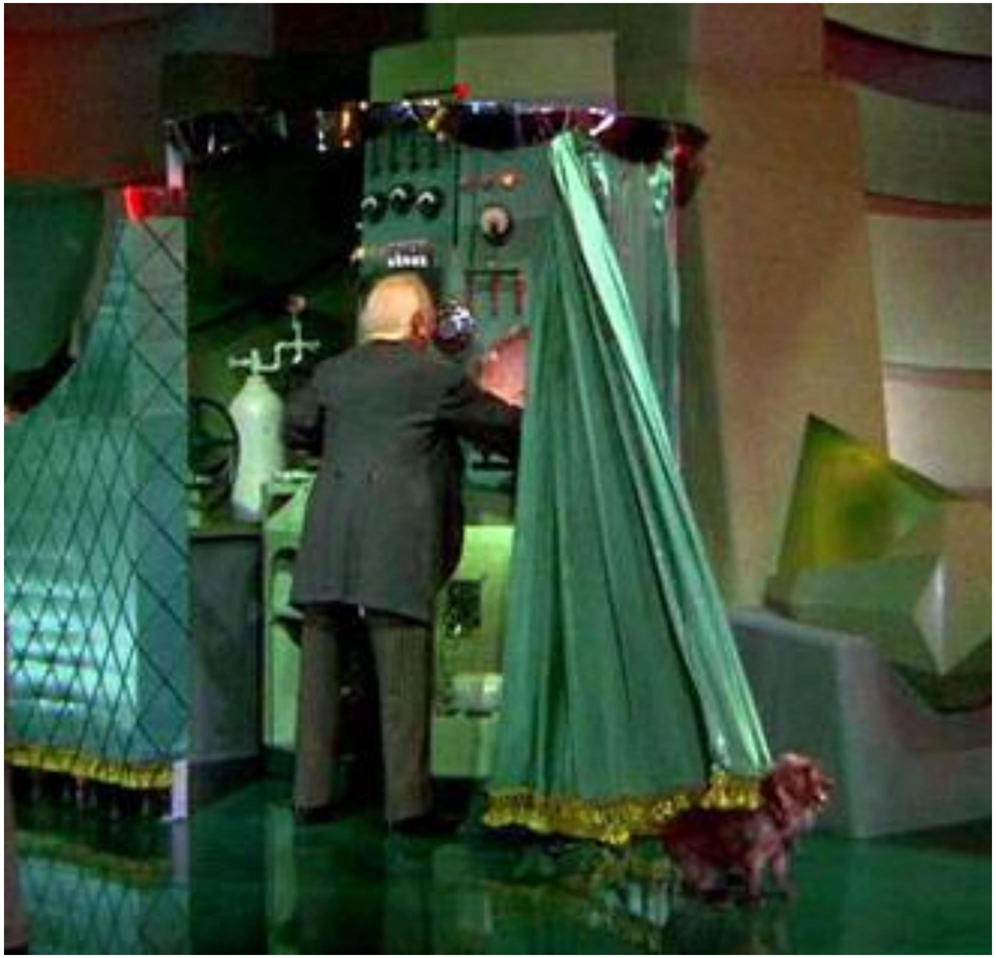
Holy crap. What is going on here?

Pay no attention to the little man behind the curtain…



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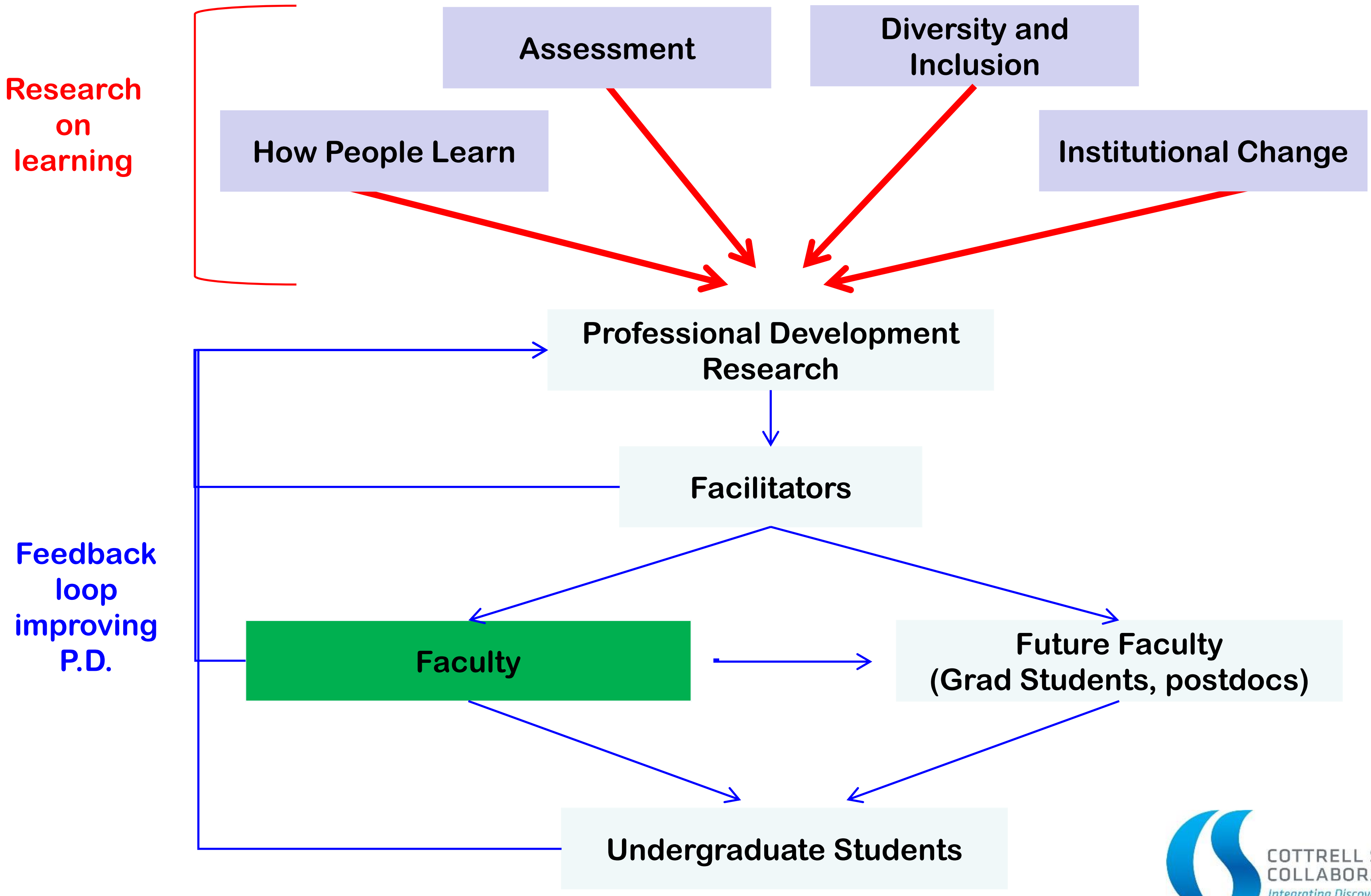
How our professional development activities are designed and implemented



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Teachable Tidbit, Part 1: Learning Objectives, Backward Design – Syllabi and Selection of Content

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Did you do your homework?

The Plan

1. Form groups (by number*)
2. Complete the worksheet in groups
3. We'll regroup shortly

Objectives for this session

1. Summarize the process of backwards design
2. Apply backwards design principles to develop learning objectives

*remember your number, please

Backwards design: *Start from the student outcome*

Traditional instruction
"content-oriented"

What will I teach?

Plan lecture

Modern instruction
"learning-oriented"

What should students learn?

How will I measure that learning?

What activities promote that learning?

Design instruction and activities

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Core of backwards design is a choice

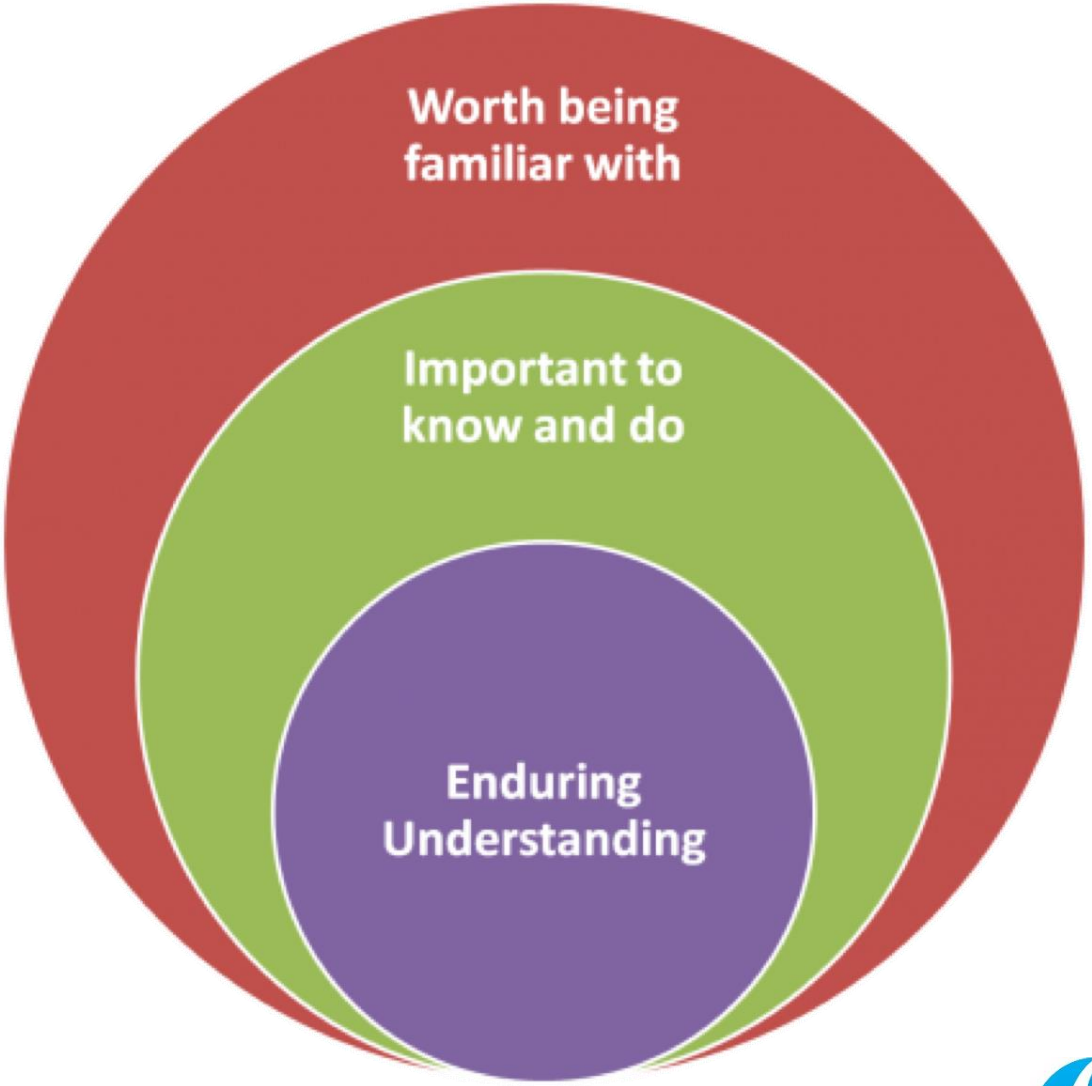

Image from https://cft.vanderbilt.edu/guides-sub-pages/understanding-by-design/

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Getting to your tidbit

Course objectives

Week or chapter objectives

Part of one day's content = **Tidbit**

Now what?

Tidbit = part of one class = content

Your goal: Turn that into a class experience

Step 1. Identify the content area
Step 2. Pick a key concept or skill
Step 3. Articulate goal for students (objective)

Step 4. Decide how to measure the outcome

Step 5. Pick activity for content/skill

Step 6. Practice

Work time now. Back to syllabi later.

A brief (abrupt) transition to syllabi

What items are required on a syllabus?

Only the items that my employer requires.

What can you accomplish on your syllabus?

Communicate key facts
Set the academic tone
Establish how you interact with students
Create (or minimize) anxiety

Teaching Centers *love* to help with syllabi

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The Two Most Important Items

1. The above schedule, policies, procedures and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement and/or to ensure better student learning.

2. Students may vary in their competency levels on these abilities. Students can expect to acquire these abilities only if they honor all course policies, attend class meetings regularly, complete all assigned work in good faith and on time, and meet all other course expectations.

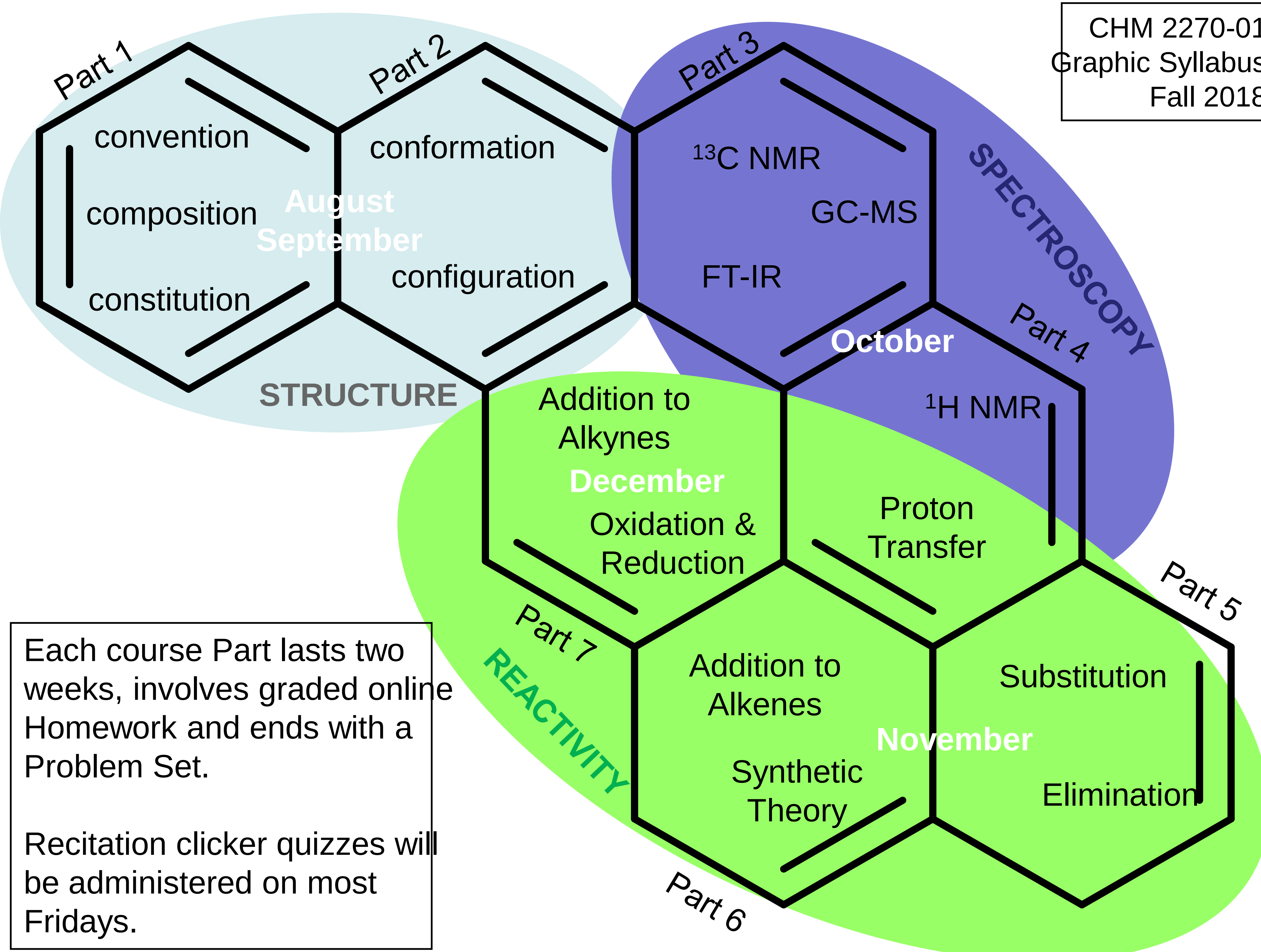
Not including these may lead to…complications

The Graphic Syllabus and the Outcomes Map

COMMUNICATING YOUR COURSE

LINDA B. NILSON

CHM 2270-01
Graphic Syllabus
Fall 2018



Each course Part lasts two weeks, involves graded online Homework and ends with a Problem Set.

Recitation clicker quizzes will be administered on most Fridays.

CHM 2270-01 Outcomes Map Fall 2018

As students progress through the course, they will be able to…

- ❒ Apply the conventions of organic chemical composition in the modeling of molecular structure: valence, electron pair domains, molecular formula, Lewis/line-angle structures, resonance, 3D geometry
- ❒ Define the primary importance of organic constitution: functional groups, IUPAC Nomenclature
- ❒ Differentiate between the major theories of bonding: valence bond vs. molecular orbital, thermodynamic bond strength

→ Communicate in the conventions and nomenclature of Organic Chemistry

- ❒ Compare the different relationships of isomerism
- ❒ Correlate single bond rotation to conformational isomers
- ❒ Explain how 3D spatial arrangement gives rise to configurational isomers

→ Differentiate among the concepts of constitutional, conformational and configurational isomerism.

- ❒ Integrate knowledge of structural symmetry with Nuclear Magnetic Resonance data: ^{13}C, ^{1}H
- ❒ Connect the concept of bond vibration to Fourier Transform Infrared Spectrophotometry data
- ❒ Determine the molecular formula of an unknown using Mass Spectrometry data

→ Apply the qualitative methods of Mass Spec, IR and NMR in the determination of organic chemical structure.

- ❒ Estimate the pK_a and likelihood of proton transfer using structural pattern recognition
- ❒ Predict the products of substitution/elimination reactions
- ❒ Use organic synthetic theory to assemble specific target structures
- ❒ Contrast the mechanisms of addition reactions to alkenes and alkynes
- ❒ Relate the concepts of oxidation and reduction to organic reactions

→ Determine the general modes of heterolytic organic reaction and employ this knowledge in the solving of mechanistic problems.

Evaluate organic molecules' structure and reactivity

ORGANIC CHEMISTRY 1

CHEM 2410

Instructor: Dr. Erin Whitteck
Office: Shannon-206
E-mail: erin.whitteck@slu.edu

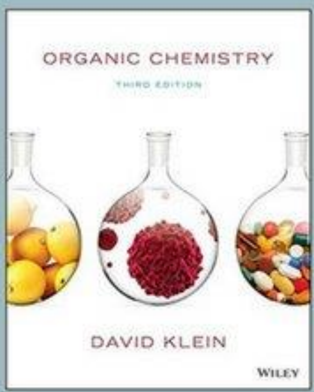
What we will learn

Build foundation of chemical intuition

Learn spectroscopic tools to inspect molecules

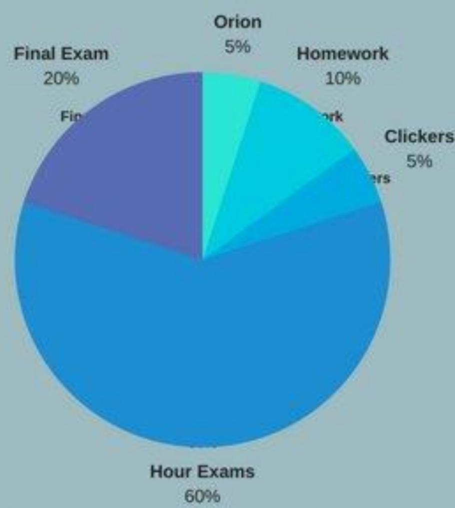
Apply chemical intuition to predict mechanisms, and build molecules

REQUIRED MATERIALS



- WileyPLUS required
- Model kit and Organic Chemistry as a second language optional

ASSIGNMENTS



- 2 lowest homework and Orion assignments can be dropped
- 50% of clicker questions correct to achieve 100% of points
- If final exam grade greater than any hour exam grade lowest hour exam grade will be replaced

GRADE SCALE

A	88.0%
A-	84.0%
B+	80.0%
B	72.0%
B-	68.0%
C+	64.0%
C	56.0%
C-	52.0%
D	44.0%
F	