

Using the diverse question types in iClicker to engage students in the classroom

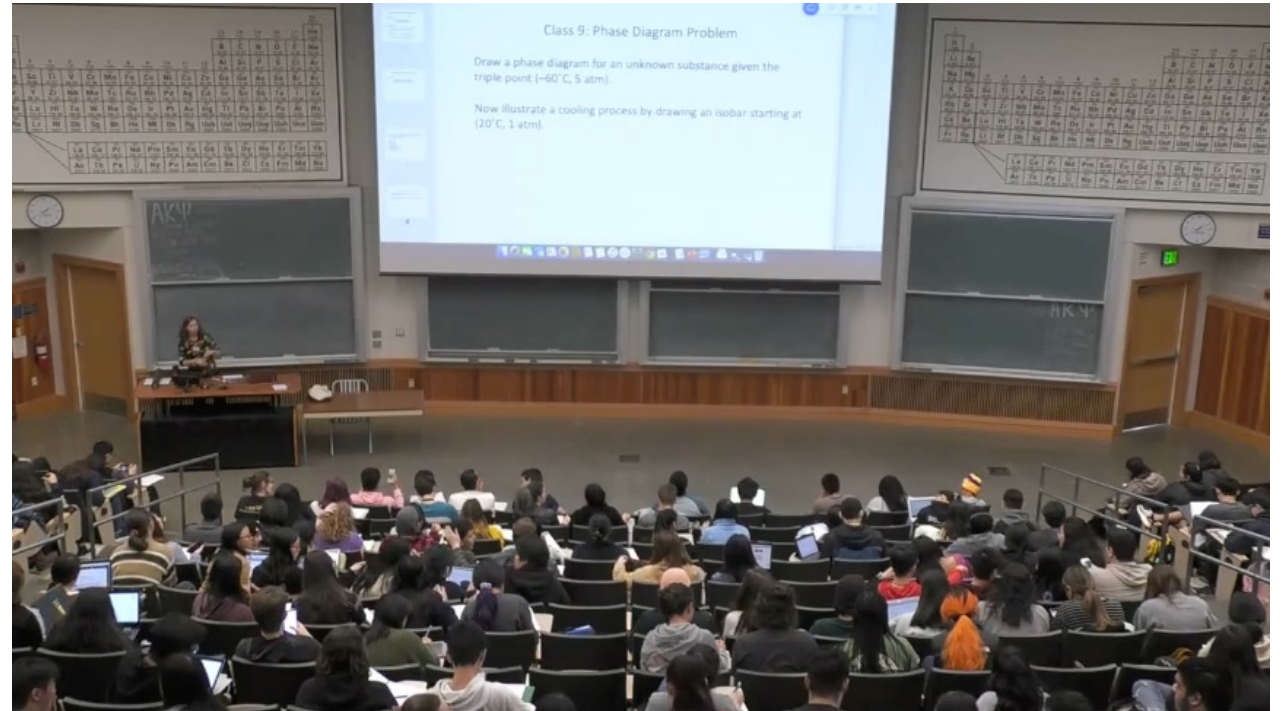


Whitney C. Duim
Assistant Professor of Teaching Chemistry
wcduim@ucdavis.edu

UC DAVIS
UNIVERSITY OF CALIFORNIA
DEPARTMENT OF CHEMISTRY

Classes I teach

- General Chemistry
- Analytical & Physical Chemical Methods
- Physical Chemistry for the Life Sciences
- Pharmaceutical Chemistry
- Fall 2022: CURE



With students 1st to 4th years, 50-400/class, transfer students...

Goal: increase student engagement with the material

**Active problem
solving and practice.**

**Reduce barriers to
participation and
engagement.**

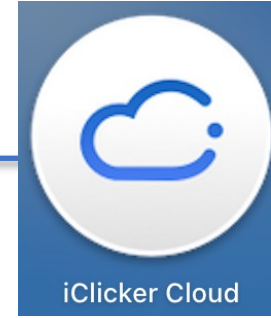
Active problem solving and practice.

- real-time participation and student, instructor feedback

Reduce barriers to participation and engagement.

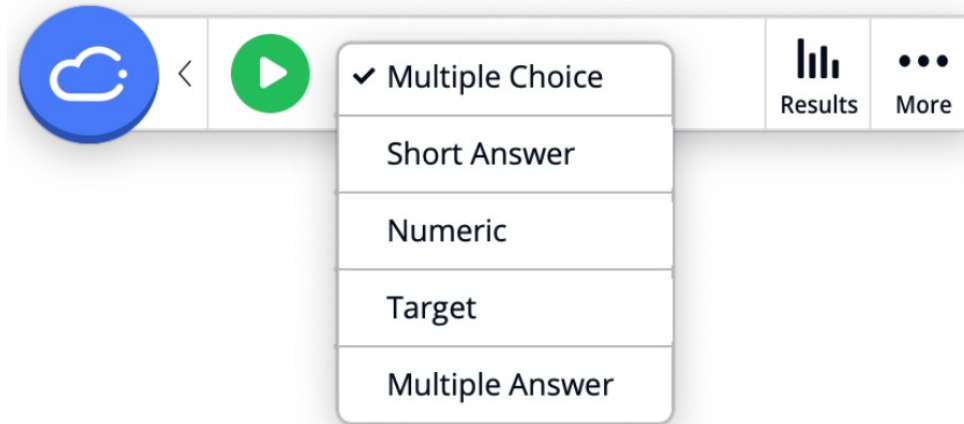
- barriers: anxiety, tech
- anonymous participation
- use own smartphones, tablets
- no credit assigned
- equity and inclusion

iClicker Cloud resources



- UC Davis Knowledge Base
 - <https://kb.ucdavis.edu/?id=1314>
 - “Note that as of Fall 2020, the UC Davis Bookstore acquired a **campus-wide license for all students to use the iClicker Student App at no cost.**”
 - "Note: The cost of the iClicker Student App (formerly known as Reef) is now **covered** by the Equitable Access Program for all UC Davis students, **whether they opt in or out of Equitable Access.**"
 - <https://kb.ucdavis.edu/?id=1374>
- iClicker
 - <https://www.iclicker.com/>
 - <https://macmillan.force.com/iclicker/s/article/Polling-Question-Types>

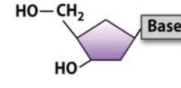

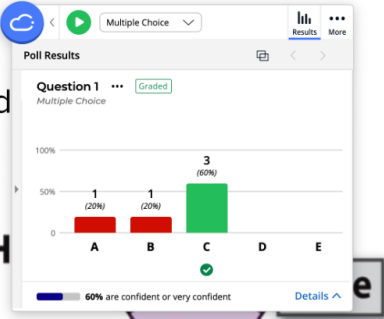
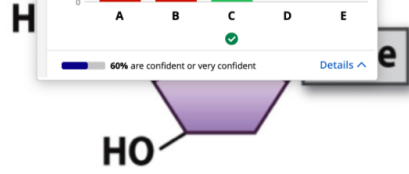
Types of questions



review questions at
the start of class

practice problems
during class

Multiple choice

Student view	Instructor view
<p>Question 1</p> <p>Multiple Choice</p> <p>In-Class Question: Multiple Choice</p> <p>Why aren't nucleosides incorporated into DNA?</p> <ul style="list-style-type: none">A. The bases are not fully assembled.B. The sugar is not in the right form.C. There are no phosphates to make the phosphodiester bonds.D. The peptide bonds don't form.  <p>Answer Received</p> <p>C</p> <div><p>A B C D E</p></div>  <p>How confident are you in your answer?</p> <div><p>Not confident Somewhat confident Confident Very confident</p></div>	<p>In-Class Question: Multiple Choice</p> <p>Why aren't nucleosides incorporated</p> <ul style="list-style-type: none">A. The bases are not fully assembled.B. The sugar is not in the right form.C. There are no phosphates to make the phosphodiester bonds.D. The peptide bonds don't form.   <p>Biology: How Life Works, Second Edition © 2016 Macmillan Education</p>

Multiple choice: review question

Question 1 GRADED 1.00 point possible
Multiple Choice



Review

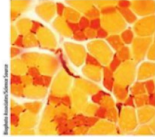

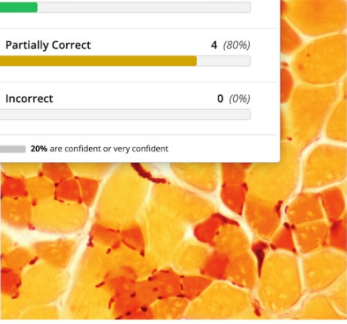
How would you expect the following molecule to interact with DNA?

CN1C=CC2=C1C(=O)N(C)CC2

- A. intercalation only
- B. groove binding only
- C. electrostatic binding only
- D. intercalation and electrostatic binding
- E. groove binding and electrostatic binding

Response	Count	Points
A	1 (6%)	0.00
B	0	0.00
C	1 (6%)	0.00
<input checked="" type="checkbox"/> D	8 (50%)	1.00
E	6 (38%)	0.00

Multiple answer

Student view	Instructor view						
<p>Question 5</p> <p>Multiple Answer</p> <div><p>In-Class Question: Multiple Answer</p><p>Fast-twitch muscles:</p><ul style="list-style-type: none">A. consume more ATP than slow-twitch fibers.B. obtain energy mainly through glycolysis.C. have higher concentrations of myoglobin and mitochondria than slow-twitch muscles.D. have less resistance to fatigue than slow-twitch fibers.E. are found in greater number in sprinters compared to marathoners.</div> <p>Answer Received</p> <p>A, E</p> <div><p>A B C D E</p></div> <p>Send</p> <div></div> <p>How confident are you in your answer?</p> <div><p>Not confident Somewhat confident Confident Very confident</p></div>	<p>In-Class Question: Multiple Answer</p> <p>Fast-twitch muscles:</p> <ul style="list-style-type: none">A. consume more ATP than slow-twitch fibers.B. obtain energy mainly through glycolysis.C. have higher concentrations of myoglobin and mitochondria than slow-twitch muscles.D. have less resistance to fatigue than slow-twitch fibers.E. are found in greater number in sprinters compared to marathoners. <div><p>Multiple Answer</p><p>Question 5 ... Graded Overview Responses</p><table border="1"><tr><td>Correct (A, B, D)</td><td>1 (20%)</td></tr><tr><td>Partially Correct</td><td>4 (80%)</td></tr><tr><td>Incorrect</td><td>0 (0%)</td></tr></table><p>20% are confident or very confident</p></div> 	Correct (A, B, D)	1 (20%)	Partially Correct	4 (80%)	Incorrect	0 (0%)
Correct (A, B, D)	1 (20%)						
Partially Correct	4 (80%)						
Incorrect	0 (0%)						

Multiple answer: review question

Question 1 Multiple Answer



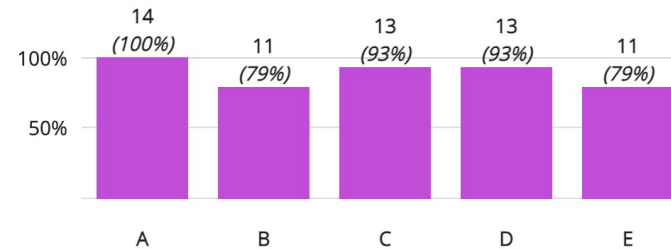
W. Duim, UC Davis, 2020-2021

Review question

Which of the following affects the rate of metabolism of a drug? Select all that apply.

- A. age of patient
- B. drug taken with vs. without food
- C. drinking grapefruit juice or St. John's Wort tea
- D. genetics
- E. how much drug is taken at once

Select Correct Answers

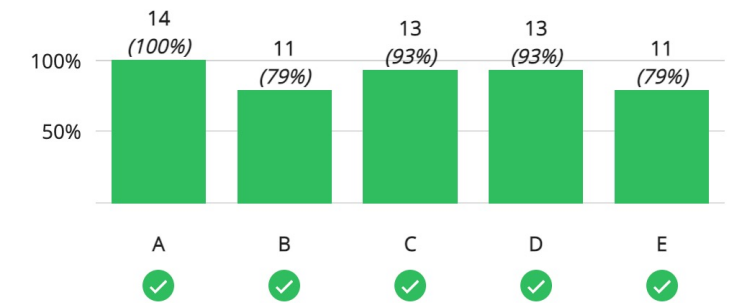


Student Responses

View All Student Responses 14 Responses

Response	Count	Percentage	Points
A	1	7%	0.00
A, B, C, D	2	14%	0.00
A, B, C, D, E	9	64%	0.00
A, C, D, E	2	14%	0.00

Select Correct Answers



Student Responses

Distribution	Count	Percentage	Points
Correct (A, B, C, D, E)	9	64%	1.00
Partially Correct	5	36%	-
Incorrect	0	0%	-

Short answer: single words or sentences

Quick write: Write down anything you remember about enzymes, from other classes or this class.

They are biological catalysts that act by reducing activation energy through stabilization of the transition state. They can be denatured.

Enzymes only changed the activation energy, not the change in free energy between reactants and products

They catalyze and speed up the rate of reaction

Enzymes reduce the activation energy required for a reaction but don't change the equilibrium.

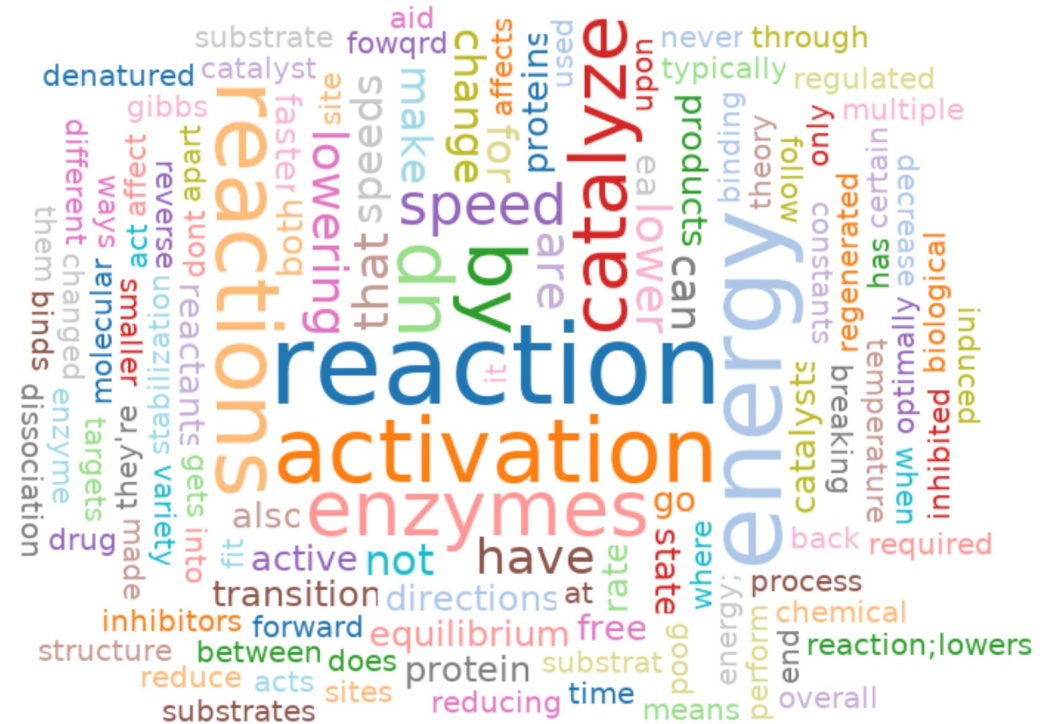
They catalyze reactions and never get used up. Lower activation energy for both directions of reactions.

Enzymes speed up a reaction in both forward and back directions. They also make the energy of activation lower, by a variety of means.

a molecular structure to aid in the chemical process of a reaction to lower the activation energy and speed up the time of the reaction

Follow induced fit theory when binding to substrates and are good drug targets

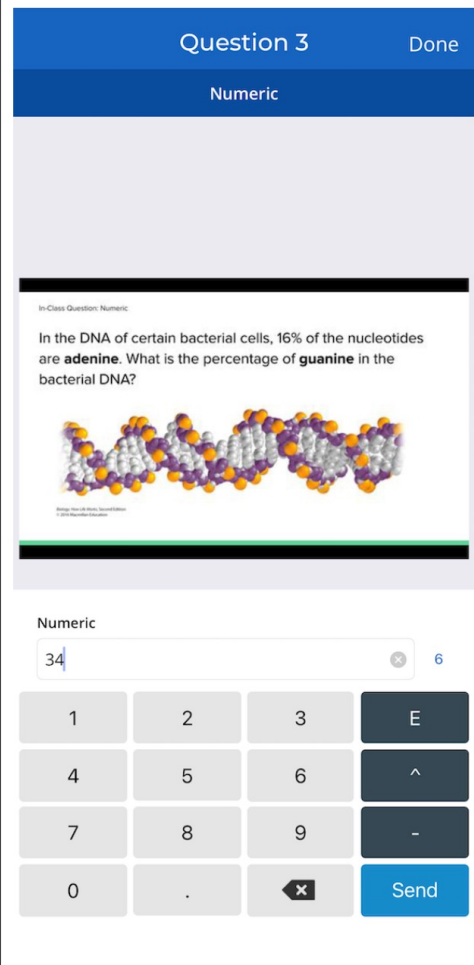
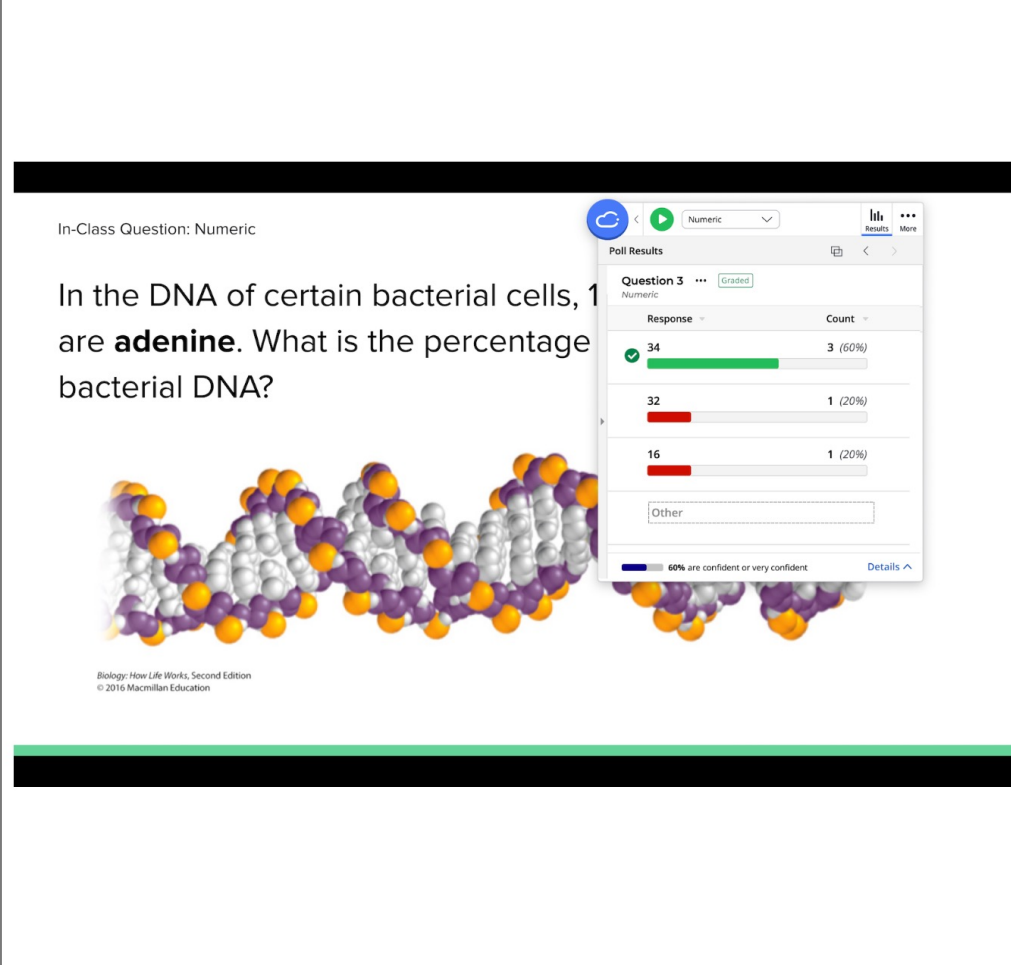
make a word cloud!



Numeric

Supports

- ✓ scientific notation
- ✓ decimals
- ✓ exponents

Student view	Instructor view
	

Target: practice problem

Lecture9_F2021_Duim_handout.pdf
Page 6 of 29

Adenosine monophosphate (AMP)

Remdesivir

ProTide piece

Locate a bioisosteric replacement on Remdesivir.

<https://theconversation.com/remdesivir-explained-what-makes-this-drug-work-against-viruses-137751>

W. Duim, UC Davis, 2020-2021

6

- Send image to student devices
- Students tap on their screens

	Count
● Total Responses	17

Feedback from students: Equity, Engagement, and Inclusion Mid-Quarter Inquiry



UC DAVIS

Center for Educational Effectiveness

Office of Undergraduate Education

Spring 2022 Physical Chemistry for the Life Sciences

“The professor utilizes online iClicker questions to quiz everyone at the beginning of class; it is used to help Prof. Duim understand what the class knows. **I enjoy the anonymity of it** as I can be involved with the class without being embarrassed about answering incorrectly.”

“I really appreciate the clicker questions she includes in the lecture. Personally, it **encourages me to actually pay attention in class and try to understand the concepts** because it's nice to see when I get those clicker questions right. Makes me feel like I actually understand something! This class is one of the top classes I struggle with.”

“I like the clicker questions that are included to **help make sure I’m on the right track!**”

iClicker page in Canvas (feel free to copy/adapt for your use!)

iClicker personal response system

We will be using iClicker for in-class questions and polls. iClicker is **free**: UC Davis has acquired a campus-wide license and the cost of the iClicker Student App (formerly known as Reef) is now covered by the Equitable Access Program for all UC Davis students, whether they opt in or out of Equitable Access.

Join Link: <https://join.iclicker.com/PRR2N>

iClicker App: Download the IOS or Android Student App (formerly known as REEF) to your device, and/or go to <https://student.iclicker.com/#/login> and create your student account.

iClicker questions are not worth any points: they are for you to test your knowledge, and for me to assess student learning. Therefore you do not need to sync your account to Canvas, etc.

Note: If you already have an iClicker remote, you may use it or the Student App. Some question types may require the Student App to answer. To connect with the base, press and hold the On/Off button on the remote until the Power indicator light begins flashing or the LCD screen shows a flashing frequency code. Enter the 2-character frequency **AA** code using the buttons (A B C D) on the clicker.

For additional information, please see:

https://servicehub.ucdavis.edu/servicehub?id=ucd_kb_article&sysparm_article=KB0001374

A final thought...



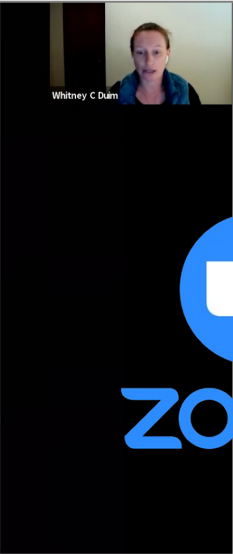

Winter 2020

Learning Objectives
Class 6: 1/15/2021
Ch 16: Liquids and Solids
Read 16.2, 16.10, 16.11

Describe	Describe an molecules.
Describe	Describe liq
Define	Define vapor pressure.
Recognize	Recognize the effect of temperature and intermolecular forces on vapor pressure.

2020 - 2021

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How do we persuade students to attend class in person?



Fall 2021 - now

Acknowledgments

- SITT 2022 Organizers
- Academic Technology Services
- DOLCE and Faculty Forums
- UC Davis Center for Educational Effectiveness



Thank you!