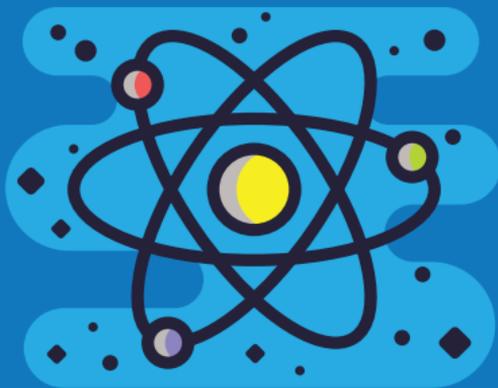




---

# General Chemistry: A Top Hat Interactive Text



# General Chemistry: A Top Hat Interactive Text



# Contents

## GENERAL CHEMISTRY

- 1 The Basics of Chemistry
- 2 Matter at the Atomic Level
- 3 Molecules, Compounds, and Their Composition
- 4 Chemical Reactions and Stoichiometry
- 5 Thermochemistry
- 6 Early Quantum Theory: The Nature of Light and Matter
- 7 Quantum Theory, Atomic Structure, and Periodicity
- 8 Representing Valence Electrons: Lewis Structures of Atoms, Ions, and Molecules
- 9 Theories of Chemical Structure and Bonding
- 10 Gases
- 11 Liquids, Solids and Intermolecular Forces
- 12 Solutions
- 13 Chemical Kinetics
- 14 Chemical Equilibrium
- 15 Acids and Bases
- 16 Aqueous Equilibria
- 17 Spontaneity and Free Energy
- 18 Oxidation-Reduction Reactions and Electrochemistry
- 19 Nuclear Chemistry
- 20 The Main Group Elements
- 21 Coordination Chemistry



# Customizability

Top Hat Interactive Texts give professors full control over the content of their course material.

Learning objectives, chapters, instructional videos or questions can be added, modified or deleted, to suit your particular course and teaching style.

Unlike the fixed layouts of printed textbooks, Top Hat Interactive Texts won't become outdated and require new editions to be purchased every few years. Instead, professors can customize and curate their student's curriculum at any time.

CH06: Early Experiments

- Explain characteristics of an electromagnetic wave.
- Calculate a wave's frequency, wavelength, and/or energy.
- Know the regions that make up the electromagnetic spectrum and their ordering.
- Explain atomic emission and use the Rydberg equation and Bohr frequency condition for the hydrogen atom.
- Define and explain "quantized" and "discrete."
- Understand and use the photoelectric effect equation.
- Define and explain the photoelectric effect.
- Understand the contributions of Planck, Hertz, Einstein, de Broglie, Bohr, Thompson, and Heisenberg to quantum mechanics.

6.1 Introduction: The Transition Away from Classical Mechanics

All changes were saved. [Save](#) [Close](#)

## Embedded Video

Sometimes complex ideas or procedures are better conveyed through video. Top Hat Interactive Texts give you the power to embed Vimeo or Youtube videos in course material where students can view and review as many times as they need.

General Chemistry: A Top Hat Interactive Text also comes prepared with over 30 original instructional videos that walk students through select problems from each chapter. Embedding additional videos is easy and integrates seamlessly with the rest of your course material.

Using videos to demonstrate key course concepts is useful for students who are visual learners. Make your teaching more fun and engaging with embedded videos in General Chemistry: A Top Hat Interactive Text.

CH06: Early Experiment

Watch the video below for the solution to Question 6.13]



6.4.2 Planck and Blackbody Radiation

Unsaved Changes - Last Save was 4 minutes ago

Save

Close



# Student Benefits

Top Hat Interactive Texts make ordinary learning experiences extraordinary. Interactive questions and exercises give students instant guidance and recognition as they work to master difficult course material.

General Chemistry: A Top Hat Interactive Text also comes with a complete solution key for each problem in the text, not just answers, but step-by-step walkthroughs of how to arrive at each answer.

Top Hat texts are digital, so there's no heavy, expensive paper block to haul around—or to forget at home. With Top Hat interactive texts, students can now study, practice and review their personal participation and performance stats all in one place, and save money.

**Poe Dameron**  
poedameron | poedameron@tophat.com

Course Average (Correctness does not include items that are not scored): **77.8%** (56% correctness, 100% participation)

Attendance Record: **100%** (5/5 attended, 0 absent)

### Poe Dameron Student Answers

Item Name	Student Answer	Date Answered	Correctness	Participation
Content			2.5	4.5
Book 1 - Master Copy			2.5	4.5
CH01: Homework...			2.5	4.5
Question H1.3 If $n = 2$ , which values of $l$ are allowed?	1	Feb 12 2016 3:19 PM	0.5 / 0.5	0.5 / 0.5
Question H1.5 If $n = 2$ , what type of orbitals are possible?	3p	Feb 12 2016 3:20 PM	0.5 / 0.5	0.5 / 0.5
Question H1.6 What type of orbital(s) can have $m_l = -3$ ?	f	Feb 12 2016 3:20 PM	0.5 / 0.5	0.5 / 0.5
Question H1.7 Atomic $n = 3, l = 2$ and $m_l = -1$ . Identify the possible...	2, 3	Feb 12 2016 3:00 PM	0 / 0.5	0.5 / 0.5
Question H1.8				

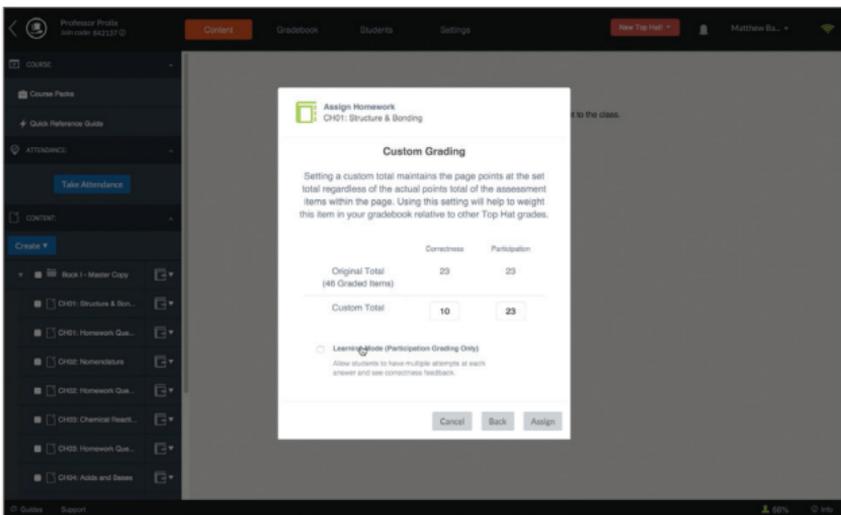
### Attendance

Session	Date	Time	Attendance
Session 2	Nov 12 2015	3:26 PM	Attended / Absent
Session 7	Nov 12 2015	3:21 PM	Attended / Absent
Session 4	Nov 12 2015	3:21 PM	Attended / Absent
Session 5	Nov 12 2015	3:19 PM	Attended / Absent
Session 4	Nov 12 2015	3:18 PM	Attended / Absent

# Automatic Grades

Top Hat Interactive Texts help professors create quizzes with flexible grading schemes that are automatically marked and tracked in the Gradebook. Chapter quizzes or reviews can be conducted and completed in class or from home, and taken up at their convenience.

Flexible grading schemes let you decide how to weight each quiz or assignment and help save you time and resources collecting, marking and handing back quizzes and assignments.



Assign Homework  
CH01: Structure & Bonding

### Custom Grading

Setting a custom total maintains the page points at the set total regardless of the actual points total of the assessment items within the page. Using this setting will help to weight this item in your gradebook relative to other Top Hat grades.

	Correctness	Participation
Original Total (All Graded Items)	23	23
Custom Total	10	23

Learning Goals (Participation Grading Only)  
Allow students to have multiple attempts at each answer and see correctness feedback.

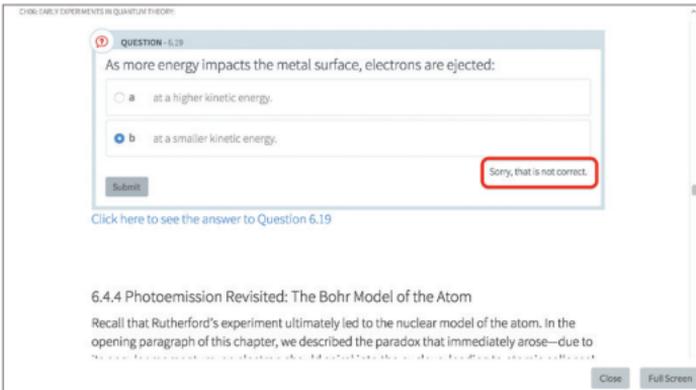
Cancel Back Assign

# Live Feedback

Top Hat Interactive Texts empower students to take responsibility for their learning. Make your course material magnetic by giving students in-line questions that provide real-time learning feedback.

Interactive multiple choice, word answer and numeric questions make difficult or daunting course material approachable and resonant. Live feedback also makes chapter reviews engaging and individual practice encouraging as students are notified instantly if they have answered a question correctly or not.

This real time feedback enables students to hone in and focus on confusing concepts sooner, and be rewarded for their efforts as they progress through the course. You can even track your classes participation in a glance, in the Gradebook. Stimulate active learning in your classroom—and in your text—with General Chemistry: A Top Hat Interactive Text.



CH06.04.19 EXPERIMENTS IN QUANTUM THEORY

**QUESTION - 6.19**

As more energy impacts the metal surface, electrons are ejected:

- a at a higher kinetic energy.
- b at a smaller kinetic energy.

Sorry, that is not correct.

[Click here to see the answer to Question 6.19](#)

**6.4.4 Photoemission Revisited: The Bohr Model of the Atom**

Recall that Rutherford's experiment ultimately led to the nuclear model of the atom. In the opening paragraph of this chapter, we described the paradox that immediately arose—due to

# Authors & Contributors



## **FRANKLIN OW – EDITOR & PRINCIPAL AUTHOR**

Franklin Ow received his Ph.D from the University of California, Los Angeles. His doctoral work focused on gas-phase photochemistry of organometallic compounds in Jeffrey Zink's group. Franklin is currently an Associate Professor at East Los Angeles College, teaching introductory, general, and organic chemistry. He also lectures periodically at UCLA and Occidental College, teaching general, organic, and inorganic chemistry.



## **GREG DOMSKI – ASSISTANT EDITOR & AUTHOR**

Greg Domski earned his Ph.D. at Cornell University where he developed organometallic catalysts for living, stereoselective olefin polymerization. Dr. Domski is currently an associate professor of chemistry at Augustana College (Illinois) where he teaches general, organic, and inorganic chemistry.

## **CONTRIBUTING AUTHORS**

**CHARLES ATWOOD**

**LISA CAPRIOTTI**

**TSUN-MEI CHANG**

**PAUL COOPER**

**CARRIE MILLER**

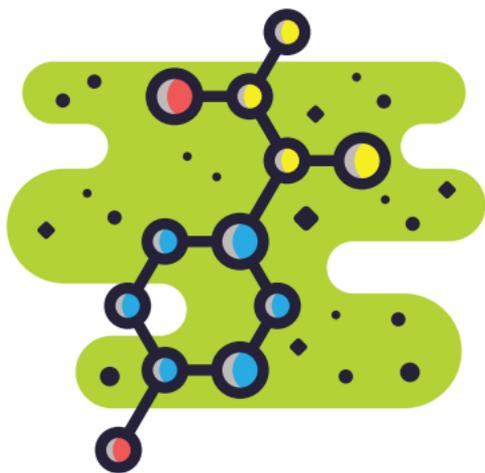
**SHERIF MOUSSA**

**JAMES ROSS**

## Pricing

Students get unlimited access to the course content for life.

\$96



## SEE HOW TOP HAT'S INNOVATIVE GENERAL CHEMISTRY INTERACTIVE TEXT CAN TRANSFORM YOUR CLASS IN 3 EASY STEPS:

### STEP 1:

Open up your web browser and navigate to [get.tophat.com/generalchemistry](https://get.tophat.com/generalchemistry).

### STEP 2:

Chat with one of our account directors for more details.

### STEP 3:

Share your course's learning objectives with our General Chemistry Instructional Designed and receive your fully customized Interactive Text ready for next term.



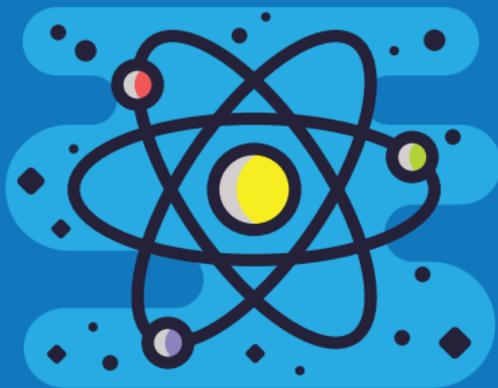
[get.tophat.com/generalchemistry](https://get.tophat.com/generalchemistry)





---

# Organic Chemistry I & II: A Top Hat Interactive Text



# Organic Chemistry I & II: A Top Hat Interactive Text



# Contents

## ORGANIC CHEMISTRY I

- 1 Structure and Bonding
- 2 Nomenclature
- 3 Chemical Reactivity and Mechanisms
- 4 Acids and Bases
- 5 Conformations of Acyclic Alkanes and Cyclohexanes
- 6 Stereochemistry
- 7  $S_N2$  Reactions
- 8  $S_N1$  Reactions and Distinguishing Between  $S_N1$  and  $S_N2$  Reactions
- 9  $E1$  Reactions to Form Alkenes
- 10  $E2$  Reactions to Form Alkenes
- 11 Substitution–Elimination: Discerning the Differences
- 12 Alkenes
- 13 Alkynes
- 14 Alcohols and Oxiranes
- 15 Ethers
- 16 IR Spectroscopy and Mass Spectrometry
- 17 NMR
- 18 Radicals

## ORGANIC CHEMISTRY II

- 19 Conjugated Systems, Orbital Symmetry and UV Spectroscopy
- 20 Aromatic Compounds
- 21 Reactions of Aromatic Compounds
- 22 Aldehydes, Ketones, and their Anomeric Derivatives
- 23 Amines
- 24 Carboxylic Acids
- 25 Carboxylic Acid Derivatives
- 26 Condensations and Alpha Substitutions of Carbonyl Compounds
- 27 Synthetic Polymers



## Interactive Exercises

Organic Chemistry I & II: A Top Hat Interactive Text comes with pre-made interactive exercises and chemical reaction demonstrations to help students navigate the sometimes intimidating sub-molecular world.

These instructive demonstrations take students through the process of complicated organic chemistry reactions, step-by-step and state-by-state. Interactive exercises work by grounding difficult to conceive, abstract concepts in a visual, hands-on learning experience.

Students can then navigate through related interactive exercises and work through complex course material, memorizing as they progress through each chapter.

DEMO

Sn2 Quiz 1

Controls

Submit

Potential Energy

Reaction Coordinate

Quiz: question 1 of 1

# Customizability

Top Hat Interactive Texts give professors full control over the content of their course material.

Learning objectives, chapters, instructional videos or questions can be added, modified or deleted, to suit your particular course and teaching style.

Unlike the fixed layouts of printed textbooks, Top Hat Interactive Texts won't become outdated and require new editions to be purchased every few years. Instead, professors can customize and curate their student's curriculum at any time.

CH06: Stereochemistry

- recognize an achiral meso compound and determine its stereochemical relationship to other stereoisomers (diastereomers).
- Identify asymmetric chiral centers and determine their R and S configurations.
- Use wedged and dashed drawings and Fischer projections to determine the configurations of compounds.
- Use wedged and dashed drawings and Fischer projections to determine the stereochemical relationships between compounds.
- Understand the effect of plane polarized light and a chiral molecule on plane polarized light.

**B** *i* H<sub>1</sub> H<sub>2</sub> H<sub>3</sub> **A**  $\uparrow$   $\downarrow$  “ ≡ 🔗

## 6.1 Overview of Isomers

**Isomers**  
Different compounds with same molecular formula

**Structural or Constitutional Isomers**  
(Isomers whose atoms have a different connectivity)

**Stereoisomers**  
(Isomers that have the same connectivity but differ in the arrangement of their atoms in space)

Unsaved Changes - Last Save was 23 minutes ago **Save** Close

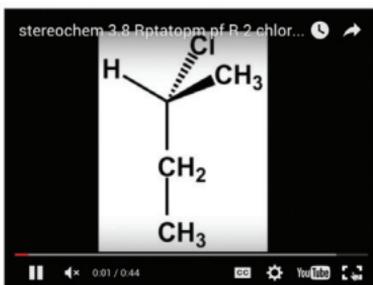
## Embedded Video

Sometimes complex ideas or procedures are better conveyed through video. Top Hat Interactive Texts give you the power to embed Vimeo or Youtube videos in course material where students can view and review as many times as they need.

Organic Chemistry I & II: A Top Hat Interactive Text also comes prepared with over 60 original instructional videos that explain challenging concepts, show 3D structures, and give step-by-step solutions to problems in the text. Embedding additional videos is easy and integrates seamlessly with the rest of your course material.

Using videos to demonstrate key course concepts is useful for students who are visual learners. Make your teaching more fun and engaging with embedded videos in Organic Chemistry I & II: A Top Hat Interactive Text.

**Step 4:** Trace a path from the highest to the lowest priority.



To stress this point, 12 different drawings of (S)-2-butanol are presented below. No matter which way you draw (S)-2-butanol, it will always be (S)-2-butanol. For each drawing, rotate the lowest priority hydrogen to the back and you will see that they all have an S configuration.



# Student Benefits

Top Hat Interactive Texts make ordinary learning experiences, extraordinary. Interactive questions and exercises give students instant guidance and recognition as they work to master difficult course material.

Top Hat texts are digital, so there's no heavy, expensive paper block to haul around—or to forget at home. With Top Hat interactive texts, students can now study, practice and review their personal participation and performance stats all in one place, and save money.

The screenshot shows the Top Hat student interface for Poe Dameron. At the top, it displays the user's name, course code (942137), and a 'GradesBook' button. The main dashboard features three key performance indicators: a 77.8% overall score (56% correctness, 100% participation), a 100% attendance rate (5/5 attended, 0 absent), and a search bar. Below these are two main sections: 'Poe Dameron Student Answers' and 'Attendance'.

**Poe Dameron Student Answers**

Item Name	Student Answer	Date Answered	Correctness	Participation
Content			2.5	4.5
Book 1 - Master Copy			2.5	4.5
CH0: Homework...			2.5	4.5
Question H1.3 If $n = 2$ , which values of $l$ are allowed?	1 ✓	Feb 12 2016 3:19 PM	0.5 / 0.5	0.5 / 0.5
Question H1.5 If $n = 3$ , what type of orbitals are possible?	3p ✓	Feb 12 2016 3:20 PM	0.5 / 0.5	0.5 / 0.5
Question H1.6 What type of orbital(s) can have $m_l = -2$ ?	f ✓	Feb 12 2016 3:20 PM	0.5 / 0.5	0.5 / 0.5
Question H1.7 Assume $n = 3$ , $l = 2$ and $m_l = -1$ . Identify the possible...	2, 3 ✗	Feb 22 2016 5:00 PM	0 / 0.5	0.5 / 0.5
Question H1.8				

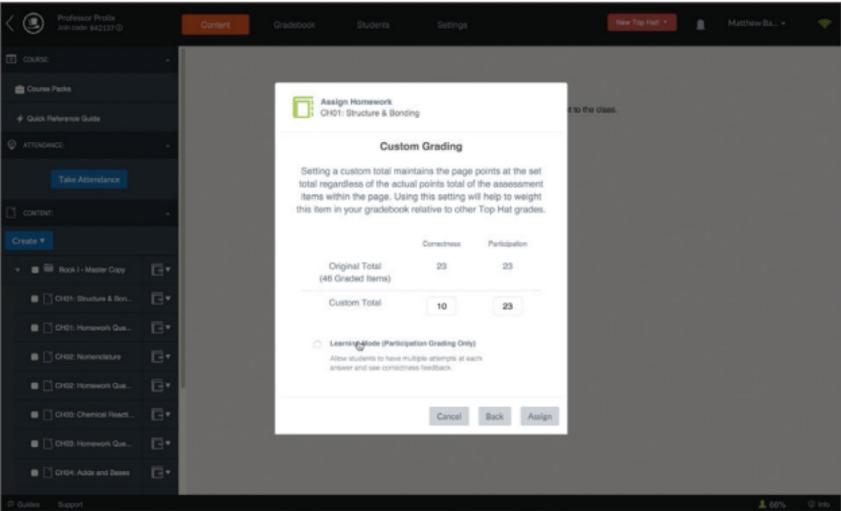
**Attendance**

Session	Date	Time	Attendance
Session 2	Nov 12 2015	3:20 PM	Attended / Absent
Session 3	Nov 12 2015	3:21 PM	Attended / Absent
Session 4	Nov 12 2015	3:21 PM	Attended / Absent
Session 5	Nov 12 2015	3:20 PM	Attended / Absent
Session 6	Nov 12 2015	3:20 PM	Attended / Absent

# Automatic Grades

Top Hat Interactive Texts help professors create quizzes with flexible grading schemes that are automatically marked and tracked in the Gradebook. Chapter quizzes or reviews can be conducted and completed in class or from home, and taken up at their convenience.

Flexible grading schemes let you decide how to weight each quiz or assignment and help save you time and resources collecting, marking and handing back quizzes and assignments.



Professor Profile  
Instructor #42217-D

Content Gradebook Students Settings

NEW Top Hat

Matthew B...

COURSE

Course Facts

Quick Reference Guide

ATTORNEYS

Take Attendance

CAUTION

Create

Back 1 - Master Copy

CH21: Structure & Bonding

CH21: Homework Q...

CH21: Nomenclature

CH21: Homework Q...

CH21: Chemical Reac...

CH21: Homework Q...

CH21: Acids and Bases

Assign Homework

CH21: Structure & Bonding

Custom Grading

Setting a custom total maintains the page points at the set total regardless of the actual points total of the assessment items within the page. Using this setting will help to weight this item in your gradebook relative to other Top Hat grades.

	Correctness	Participation
Original Total (All Graded Items)	25	25
Custom Total	10	25

Learning Goals (Participation Grading Only)

Allow students to have multiple attempts at each answer and see correctness feedback.

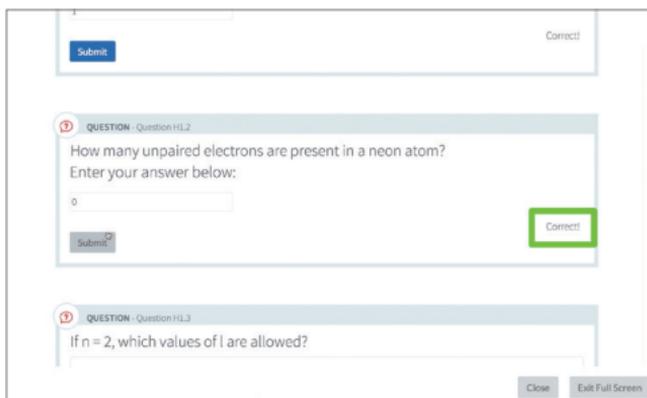
Cancel Back Assign

## Live Feedback

Top Hat Interactive Texts empower students to take responsibility for their learning. Make your course material magnetic, by giving students in-line questions that provide real-time learning feedback.

Interactive multiple choice, word answer and numeric questions make difficult or daunting course material approachable and resonant. Live feedback also makes chapter reviews engaging and individual practice encouraging as students are notified instantly if they have answered a question correctly or not.

This real time feedback enables students to hone in and focus on confusing concepts sooner, and be rewarded for their efforts as they progress through the course. You can even track your classes participation in a glance, in the Gradebook. Stimulate active learning in your classroom and in your text with Organic Chemistry I & II: A Top Hat Interactive Text.



The screenshot displays a user interface for a Top Hat Interactive Text. At the top, there is a blue 'Submit' button on the left and the word 'Correct!' on the right. Below this is a question box with a red question mark icon, labeled 'QUESTION - Question H1.2'. The question text is 'How many unpaired electrons are present in a neon atom?' followed by 'Enter your answer below:'. A text input field contains the number '0'. A 'Submit' button is located below the input field. To the right of the input field, the word 'Correct!' is displayed in a green box. Below the first question is another question box, labeled 'QUESTION - Question H1.3', with the text 'If  $n = 2$ , which values of  $l$  are allowed?'. At the bottom right of the interface, there are 'Close' and 'Exit Full Screen' buttons.

# Authors & Contributors



## STEVEN FORSEY – EDITOR & PRINCIPAL AUTHOR

Steven Forsey started his career as an educator at the University of Waterloo in 1985 as a chemistry laboratory instructor. After finishing his Ph.D. in 2004 Dr. Forsey started lecturing and has since received the Excellence of Science Teaching Award for his efforts. Dr. Forsey has long been an early adopter of technology and integrates technology in his classroom to enhance his pedagogy, and the learning experience of his students.



## FELIX NGASSA – ASSISTANT EDITOR & AUTHOR

Felix Ngassa holds a Ph.D. in organic chemistry from the University of North Dakota and an MBA from the Seidman College of Business. He is currently an Associate Professor of chemistry at Grand Valley State University. Dr. Ngassa has lectured in organic chemistry for many years and has been recognized with many teaching and research awards including GVSU CSCE Outstanding Undergraduate Mentoring Award.



## NEIL GARG – FEATURED AUTHOR

Neil Garg joined the faculty at UCLA in 2007. His undergraduate organic chemistry course (Chem 14D) is one of the most popular classes at UCLA. Neil has received several teaching accolades and has been named the State of California's 2015 Professor of the Year. Dr. Garg contributes the 'Keeping it Real' sections to the text which highlight applications of organic chemistry in medicine, everyday life, and pop culture.

## CONTRIBUTING AUTHORS

JOSÉ BOQUIN

STEPHANIE BROUET

JENNIFER CHAYTOR

GREG DOMSKI

CHRISTIAN E. MADU

CHRISTOPHER NICHOLSON

FRANKLIN OW

ROBERT S. PHILLIPS

GRIGORIY SEREDA

## Pricing

Students get unlimited access to the course content for life.



\$99

## What people are saying...



“This interactive Organic Chemistry text provides students with an active learning experience that has positively impacted their course performance. Students scores in quizzes and preliminary examinations clearly increased after implementation. Students were also

better prepared to engage in lecture discussion.”

– Professor José Boquin

“The Top Hat Interactive Organic Chemistry Text is very helpful. I like the embedded questions because I get instant feedback and understand why I am wrong, or if I did did (or did not) understand a topic.”

– Anonymous student

“The embedded questions were the most helpful, in that I could use them as quick reviews of other material or as a review after a quiz if it didn’t go well, to try and better understand the material.”

– Anonymous student

“With Top Hat being so straight-forward and easy-to-use, there were only a few times when I resorted to supplementary print textbooks in place of Top Hat’s Interactive Text.”

– Anonymous student

# Student Experience

60% of 142

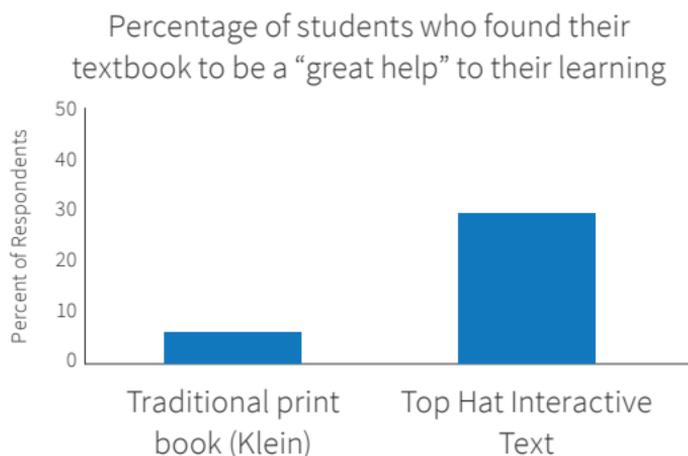
surveyed students<sup>1</sup> said that “the interactive components of the Top Hat Organic Chemistry text increased the time they spent with the course material.”

In a year-end class survey<sup>2</sup>:

92% of students who used the Top Hat interactive text said it helped their learning

vs.

65% of students who used a traditional print textbook (Klein)



<sup>1</sup> Top Hat survey of students at 4 institutions

<sup>2</sup> Data courtesy of Augustana College

## AVERAGE SCORE ON STANDARDIZED FINAL EXAM<sup>2</sup>

(combined data from 2 classes)

	2014-15 (Traditional Print Textbook)	2015-16 (Top Hat Interactive Text)	Improvement in average exam score
CHEM311	73.1%	78.8%	+5.7%
CHEM312	72.4%	76.5%	+4.1%

### Pricing

Students get unlimited access to the course content for life.

\$99



## SEE HOW TOP HAT'S INTERACTIVE ORGANIC CHEMISTRY TEXT CAN TRANSFORM YOUR CLASS IN 3 EASY STEPS:

### STEP 1:

Insert enclosed USB key into any internet connected computer then double-click the file StartHere.html or visit [get.tophat.com/organicchemistry](http://get.tophat.com/organicchemistry)

### STEP 2:

Chat with one of our account directors for more details.

### STEP 3:

Share your course's learning objectives with our Organic Chemistry Instructional Designer and receive your fully customized Interactive Text.

When making the switch, our Organic Chemistry Instructional Designer will customize your Top Hat Interactive Text to align with your existing course notes and materials—lowering the initial activation energy to zero!



[get.tophat.com/organicchemistry](https://get.tophat.com/organicchemistry)

