2022 Excellence in Online Teaching Award Nomination | Dr. Michael Evans

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February 5, 2022

To Whom It May Concern:

I write in enthusiastic nomination of Dr. Michael Evans for the 2021 Georgia Tech Teaching Excellence Award for Online Teaching. Dr. Evans has invested in innovation through educational technology in residential classes long before the onset of the COVID-19 pandemic. This preparation allowed him to lead an immediate and remarkably effective response to pandemic restrictions. In the past two years, he developed and taught exemplary remote courses in organic and introductory chemistry that set a very high standard of excellence in remote instruction within our School. These courses and his general approach to online teaching are exemplars of excellence in any context. Through his direct efforts in teaching large courses serving a variety of majors, and in the tools that he has made available to many other instructors and students, Dr. Evans has had a profoundly positive impact on the student experience during COVID-19. His YouTube channel, with more than 5 million views over its lifetime, projects the excellence of a Georgia Tech education to a global audience of chemistry learners.

Dr. Evans’ approach to online instruction is characterized by organization and engagement. He has been teaching “flipped” organic chemistry courses since Spring 2018 using a complete set of rigorous and engaging video lectures along with a well structured set of assignments and activities to promote accountability before class and engagement in class. In transitioning to remote instruction during the Spring 2020 and Summer 2020 semesters, Dr. Evans drew on this prior experience to make adjustments that were much more than emergency band-aids. For example, in his organic chemistry course (CHEM 2312) he incorporated an open-source platform for solving organic chemistry problems with immediate feedback (OpenOChem), a game-like application that promotes mechanistic reasoning (Mechanisms), and a rich messaging application (Discord) along with Microsoft Teams to encourage student-student and student-instructor communication. These tools are not added as an afterthought, but are deeply woven into the structure of the course: Dr. Evans regularly uses class time to discuss the reasons behind their adoption and the pedagogical benefits. In Summer 2021, he created a system for incentivizing student participation in his remote CHEM 2312 course, which resulted in a substantial increase in student engagement.

Dr. Evans has also been a leader in our School in the design and implementation of remote examinations, based on his twin principles of rigor and trust. His organic chemistry exams are based on examples from the recent primary literature and thus require that students apply what they have learned to new situations. He has also deliberately eschewed the use of proctoring services, instead emphasizing a relationship of trust with students that has been highly effective. In this respect, he has modeled positive relationship-building with students during the pandemic, a task that certainly became much harder with the loss of face-to-face instruction. Many of the lessons he learned during remote instruction have carried over into on-campus courses since Summer 2021.

I can imagine no one more worthy of an award recognizing innovation and accomplishment in online teaching, especially during the rapidly changing environment caused by the pandemic. Chemistry is a difficult subject to teach remotely – it is three-dimensional, logical, and builds rapidly from foundational concept to concept. Dr. Evans has done more than anyone else in our School to make it effectively accessible through a computer screen, preserving the unique
advantages of interaction with an engaged instructor. At the same time, he has projected the excellence of a Georgia Tech education to chemistry learners all over the world.

Sincerely,

M.G. Finn, Ph.D.
Professor and Chair, School of Chemistry & Biochemistry
March 16th, 2022

To Whom it May Concern:

It is a great pleasure to write in support of Dr. Evans’ nomination for the Institute’s “Excellence in Online Teaching Award”. He is a highly innovative and very energetic colleague, who devotes great effort and talent to our undergraduate instructional mission. I have known Dr. Evans since he arrived at GT in July 2013, and I have a good knowledge of his instructional activities, as he reports to me. Mike teaches courses in both our first year and organic chemistry sequences.

Dr. Evans has a long standing interest in the use of instructional technology to enhance the undergraduate experience. Pre-COVID, he implemented an extensive set of laboratory focused instructional videos and also pre-lab interactive content using the “Late Nite Labs” platform, which supports virtual labs. He has also been involved in the development of software for teaching mechanisms and also to assist students in the hypothesis driven learning of organic chemistry (DOI: 10.1021/acs.jchemed.0c00246). Because of this depth of digital experience, plus a natural gift for digital communication, he was in an excellent position to pivot to online teaching when COVID bore down on us. He has taught several different courses, as indicated on his CV, in an online format in the last 12 months. However, I will focus my comments on his masterful job of teaching CHEM 2312 (Organic Chemistry II) and CHEM 1310K (General Chemistry) online.

Dr. Evans’ offering of CHEM 1310 in Fall 2020 made use of many different layered online tools to provide a rigorous experience in a supportive environment. His course design fully exploited the opportunities for interaction that were available, and did not waste “face time” on content delivery. The core course materials were hosted using our Learning Management System, Canvas. The interactive online text “Interactive General Chemistry” was used to support the course. The lectures were offered in a synchronous flipped fashion. Lectures were prerecorded in digestible chunks, and students watched the videos and took notes on them prior to attending synchronous class sessions. The synchronous class sessions, held using the MS Teams platform, were then used for a combination of small group problem solving, and the clarification of material featured in the videos. The synchronous discussions in Teams were supported by more extensive asynchronous discussions amongst students, TAs and the instructor using the Piazza forum. Homework was assigned and administered using the Sapling online platform. Exams were administered via Canvas. To supplement these layered activities, online office hours were provided via bluejeans.

His offering of CHEM 2312, in summer 2020, also made use of a layered approach to deliver a high quality experience, but a greater range of digital tools were exploited to meet the challenges of teaching what many students view as a difficult course. Once again, an online flipped approach to delivery was adopted. Prior to class students had readings and/or videos followed by short
School of Chemistry and Biochemistry
quizzes, so that class time could be spent on interactive problem solving rather than content delivery. This interaction was facilitated using “Discord” and more lengthy asynchronous discussions amongst classmates and instructors were hosted on Piazza. Students made use of the phone app “Mechanisms” during class time to build their conceptual understanding of reaction mechanisms. For many students this is challenging, but this app can help overcome their difficulties. Much of organic chemistry requires a 3D understanding of molecular structure. In a traditional learning environment, this often built with the aid of physical models. However, Mike encouraged students to students to use a “Digital Model Kit”, as such models can be shared with classmates during online discussions in Discord or Piazza. His educational philosophy emphasizes conceptual understanding and the development of chemical reasoning skills, which transfer well to future courses. In summary, Dr. Evans approach to this course used technology in many different and powerful ways to support learning and interaction. The comments in the letter from a student in his CHEM 2312 class (see elsewhere in this package), illustrate just how powerful Dr. Evan’s approach is far better than I can.

One of the many advantages of Dr. Evan’s instructional emphasis on conceptual understanding, rather than simply knowledge, is that testing in an online environment does not have to rely on crude proctoring tools such as honorlock. While facts can be quickly Googled during a test, conceptual understanding takes time and effort, leading to tests that are far less open to abuse.

In summary, I give my strongest support to Dr. Evans’ nomination for the Institute’s “Excellence in Online Teaching Award”. He has great technological talent, wonderful communication skills and an educational philosophy that truly supports student success. He has brought all of these together to design and deliver outstanding online courses covering multiple subjects since COIVD turned our world upside down.

Yours sincerely,

Angus P. Wilkinson
Assoc. Chair and Prof. Chemistry and Biochemistry
Prof. Materials Science and Engineering
I. EARNED DEGREES

University of Illinois, Urbana-Champaign 2008 – 2013
Degree Obtained: Ph.D. Chemistry
Doctoral Advisor: Prof. Jeffrey Moore
Title of Dissertation: “Development and analysis of educational technologies for a blended organic chemistry course”

University of Kentucky 2004 – 2008
Degree Obtained: B.S. Chemistry, Mathematics minor
Cumulative GPA: 3.92

II. EMPLOYMENT HISTORY

Georgia Institute of Technology 8/2018 – present
Senior Academic Professional

Georgia Institute of Technology 7/2013 – 7/2018
Academic Professional

III. HONORS AND AWARDS

Hesburgh Teaching Fellow (GT) 2021
CTL Scholarship of Teaching and Learning Award (GT) 2021
Serve-Learn-Sustain Climate Change Fellow 2018
GT 1000 (Freshman Seminar) Instructor of the Year 2016
Georgia Tech Center for Enhancement of Teaching and Learning Teaching Scholar 2015
Georgia Tech Thank-a-Teacher Awardee 2015 – 2021

IV. EDUCATION AND MENTORSHIP

A. REMOTE COURSES TAUGHT

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<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Students</th>
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<tr>
<td>Summer 2021</td>
<td>CHEM 1212</td>
<td>Organic Chemistry II</td>
<td>61</td>
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<td>Spring 2021</td>
<td>VIP</td>
<td>STEMComm VIP</td>
<td>12</td>
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<tr>
<td>Fall 2020</td>
<td>GT 1000</td>
<td>First-year Seminar</td>
<td>16</td>
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<td>CHEM 1212K</td>
<td>Chemical Principles II Laboratory</td>
<td>207</td>
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<td>Fall 2020</td>
<td>CHEM 1310</td>
<td>General Chemistry Laboratory</td>
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<td>General Chemistry Lecture</td>
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<td>Organic Chemistry II</td>
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<tr>
<td>Spring 2020</td>
<td>CHEM 1310</td>
<td>General Chemistry Laboratory</td>
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B. ACADEMIC AND CAREER ADVISING AND GUIDANCE RESPONSIBILITIES

1. Academic advisor, School of Chemistry and Biochemistry, Georgia Tech, 2013 – present.
2. Coordinator of social events for undergraduates, School of Chemistry and Biochemistry, Georgia Tech, 2016 – present.
3. Faculty advisor, Cloudman Chess Club, 2017 – present.
4. Faculty advisor, Molecular Gastronomists, 2017 – present.
5. Faculty advisor, Georgia Tech Chapter of Lambda Sigma, 2017 – present.
6. Faculty advisor, Be the Match on Campus, 2016 – present.
7. Faculty advisor, Student Affiliates of the American Chemical Society, 2015 – 2016.

C. EDUCATIONAL INNOVATIONS AND OTHER CONTRIBUTIONS
1. Molecular Photochemistry (CHEM 4801) course
2. Molecular Thinking in Science and Society (CHEM 2801 CT) course
3. Introduction to Chemical Principles course (OMED Challenge Program)
4. STEM Communication VIP (with J. Leavey and E. Greco)
5. First-year Chemistry Laboratory Techniques video series (CHEM 1211K, CHEM 1212K, CHEM 1310).

V. RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITIES

A. PUBLICATIONS

B. OTHER PUBLICATIONS AND CREATIVE PROJECTS
https://www.youtube.com/playlist?list=PLykBd3LSjfsQH2LIPE_zwE7ukELukAOOG
https://www.youtube.com/playlist?list=PLykBd3LSjfsS4qAB8FrJfiXk05t-N37HQ
https://www.youtube.com/playlist?list=PLykBd3LSjfsSFBIMUrwmvhsxjgxsCD3t
https://www.youtube.com/watch?v=PFkJGrS_8rs&list=PLykBd3LSjfsRZpE8tgC6yILAsT16CsFeu

C. RECENT PRESENTATIONS

VI. SERVICE

A. PROFESSIONAL CONTRIBUTIONS
1. Member, American Chemical Society.

B. RECENT PUBLIC AND COMMUNITY SERVICE
2. Sober Science Speakeasy. Event during the 2020 Atlanta Science Festival, Atlanta, GA.
4. Leucine Zipper at the Silver Scream Spook Show. Event during the 2019 Atlanta Science Festival, Atlanta, GA.
5. Leucine Zipper at the Silver Scream Spook Show. Event during the 2018 Atlanta Science Festival, Atlanta, GA.
6. The Leucine Zipper + Geekapalooza Science Comedy Show. Event during the 2017 Atlanta Science Festival, Atlanta, GA.
7. The Leucine Zipper Science Show. Event during the 2016 Atlanta Science Festival, Atlanta, GA.

C. INSTITUTE CONTRIBUTIONS
1. Member of the College of Sciences Academic Faculty Advisory Council, 2021 – present.
5. Faculty Advisor, Cloudman Chess Club, 2021 – present.
6. Faculty Advisor, Georgia Tech Molecular Gastronomists Club, 2017 – present.
7. Faculty Advisor, Georgia Tech Be the Match on Campus, 2016 – present.
8. Faculty Advisor, Georgia Tech Student Affiliates of the American Chemical Society, 2015 – 2016.
10. Secretary and Member, Georgia Tech Student Activities Committee, 2015 – 2017.
11. Member, Georgia Tech School of Chemistry and Biochemistry Undergraduate Curriculum Committee, 2014 – present.

VII. PROFESSIONAL GROWTH AND DEVELOPMENT
1. Faculty Learning Community for Laboratory Classes, University System of Georgia.
2. CITI Social/Behavioral Research training, Georgia Tech
3. Question-Persuade-Refer (QPR) suicide prevention training, Georgia Tech
4. Safe Space training, Georgia Tech LGBTQA Resource Center
5. Course Design Workshop, Center for Teaching and Learning, Georgia Tech
6. Teaching Scholars Program, Center for Teaching and Learning, Georgia Tech
7. Laboratory safety and chemical inventory training, Environmental Health and Safety, Georgia Tech
Teaching Philosophy Statement
Michael Evans
February 2022

Great teaching in chemistry transports students to the sub-microscopic world of atoms and molecules and empowers them to investigate, explain, and apply complex chemical phenomena. I believe that chemistry is not only the central science, but also the most human science: a discipline that incorporates empirical observation, measurement, and model-building using concepts that we cannot see directly but that tap into profoundly rational ways of thinking about the world. This mixture of the macroscopic, sub-microscopic, and symbolic is unique to chemistry. I love engaging students in the process of model-building through analysis of laboratory data and grappling with real data sets or case studies in lecture courses. In this respect, I see my role as helping to train the next generation of builders of scientific models, regardless of the specific disciplines in which they end up. A key goal in all my courses is teaching for transfer.

Among the transferable skills that appear in both my general and organic chemistry courses, reasoning by analogy is one of the most important. I believe that to confidently use analogical reasoning, students require very deliberate exposure to analogous problems and concepts. In my organic chemistry courses, I have developed problem sets specifically designed to help students recognize structural and mechanistic analogies by presenting, for example, nucleophilic additions to carbonyls and imines alongside one another. Every instance of this type of reasoning has at its center a general “template” that both systems fit, and I prefer to expose students explicitly to these templates. Thus, I do not think of the organic chemistry student’s toolbox as a set of functional groups and reactions; instead, I see it as a collection of general structures and elementary transformations.

Because most textbooks on organic chemistry do not take this approach, I have developed videos, written materials, and problem sets of my own to help students learn to think in this way. I strongly believe that careful planning, good design, and effective presentation skills are essential prerequisites of educational videos. Thus, I engage in as much planning as I can (given time constraints) in the preparation of videos, with the aim of creating resources that can last for several years at least. I also carefully design problem sets and examinations so that students are assessed on their ability to apply generalized concepts. Assessing students in this way motivates them to reason by analogy and shows them that analogical thinking a useful skill.

Teaching large introductory laboratory courses has given me an appreciation of the mentoring, coordination, and delegation required to run a course primarily taught by graduate teaching assistants. Training graduate students to be good teachers is not as simple as handing them a set of slides and sending them on their way. I believe in maintaining complete transparency with teaching assistants with respect to my teaching philosophy and engaging in a conversation with them about what they find effective as teachers. Although not all graduate students are receptive to the idea of spending time teaching, I strive to convince them that the communication and reasoning skills they will develop as teaching assistants will serve them well in a research context. I also actively express concern for their well-being and ask them to do the
same for their students. I believe that the human element of mentoring TA’s is as important as—if not more important than—the technical element.

For students in the chemistry laboratory, I believe that negative emotional responses to the content and environment represent the single biggest roadblock to academic success. Feelings of anxiety, helplessness, and frustration limit students’ ability to operate with confidence independently in the laboratory. With this in mind, I devote considerable attention in my courses to developing materials that help students prepare to enter the laboratory with confidence and comfort. Mindfulness is introduced at the start of the semester as a key component of effective notebook keeping and as a mechanism for metacognition in the laboratory space. Technique tutorial videos introduce students to the glassware, instruments, and methods they will use to generate data. Chemical safety is covered using the RAMP framework, which enables students to recognize hazards, assess risks, mitigate these risks, and prepare for emergencies before experiments take place.

In my courses, I strive to hold students to rigorous academic standards while offering a great deal of support as they learn beyond their comfort zone. High standards, strong support is a mantra I use that sums up this philosophy. In this spirit, I have recently begun to implement aspects of specifications grading in my laboratory and lecture courses. Individual assignments include detailed specifications for satisfactory work and are graded on a pass/fail basis with some opportunities for revision or repetition. For example, in my laboratory courses I have developed a Certified Reagent Operations assignment that requires students to execute good technique under observation by their lab partner or teaching assistant. In my Molecular Photochemistry course, the final letter grade is based on satisfactory completion of minimal numbers of each type of assignment. Although the specifications are strict to ensure high quality in the final products, simultaneous support ensures that students can ask questions and receive feedback before deadlines arrive.

At the same time, accessibility and approachability are extremely important to me as an educator. I make a conscious effort to use enthusiasm for chemistry to draw students into conversations. I love using real-time messaging and course forums to engage students in conversation, not only to help them learn but also to help me understand the misconceptions and other roadblocks that can hold students back. I profoundly believe that accessibility makes me a better educator and operate every single day on that belief.

My teaching philosophy can be summarized as teaching for transfer, promoting complex scientific reasoning, mentoring teaching assistants for effective large-scale instruction, battling negative emotional responses in the laboratory, and maintaining high standards and strong support for students. That said, I still feel I have a great deal of professional growth and development ahead of me as I improve my teaching practice in all these areas. Modeling growth for my students means to learn about new teaching strategies, chemical concepts, and ways of thinking about education. Learning continually from students, colleagues, and my own educational research keeps me engaged in teaching and will do so for many years to come.
Innovative Teaching Artifacts

1. Video lectures for Organic Chemistry I and Organic Chemistry II (CHEM 2311, 2312, 2313) and Molecular Photochemistry (CHEM 4801)

These videos are regularly used as part of my flipped approach to teaching organic chemistry and photochemistry. They exemplify my efficient, visually engaging, and content-rich approach to instructional media.
2. Remote experiment protocol (*Simulated Stoichiometry Challenges*) employing scaffolded student engagement

This protocol was written in Fall 2020 to serve as a remote laboratory experiment centered on computer simulations involving stoichiometry. Prompts to work individually, in small groups, and in large groups and specific role assignments exemplify my scaffolded approach to remote experiments, which encourage students to stay on task and work together effectively.

The second part of this experiment is an extreme exercise in reaction design and planning. The goal is straightforward: to prepare a solution of pure I starting from a solution of pure A. However, A must be carried through four reactions to be transformed into I, each of which involves unique reagents and molar ratios. Furthermore, exactly 50 mL of each reagent solution must be used, so careful dilution will be necessary. If all goes according to plan, a pure yellow solution of I is obtained at the end of the procedure. However, it will be up to you to experiment and design the procedure to prepare pure "yellow Jello."

In the third part of this experiment, we will explore the reaction of aqueous sodium chloride with aqueous silver nitrate, which gives a white precipitate of silver chloride and aqueous sodium nitrate. We’ll apply stoichiometry to predict the masses of reactants that should be combined and verify these masses by running the reaction.

Procedures

A. Determining Stoichiometric Coefficients

1. **Access the simulation (individual).** Open the simulation at this link ([http://chemcollective.org/activities/vlab77](http://chemcollective.org/activities/vlab77)) and click "Determining Stoichiometric Coefficients" in the top right corner. Read the instructions that appear.

2. **Determine the reactants and products (small group).** In your small group of 3 – 4 students, assign the following roles: a technician who will share their screen and carry out the procedure in the virtual laboratory, a reader who will dictate the procedure to the technician, a recorder responsible for recording data and observations, and a reporter who will share findings back in the main room. In groups of three students, the recorder and reporter roles can be combined.

3. Select a pair of substances to combine and an amount in which to combine them. Make sure that the recorder notes the amounts and types of substances combined.

4. The technician should then mix the substances. The recorder should note the composition of the mixture once the reaction is complete.

5. Repeat steps 3 and 4 until you have elucidated the identities of the reactants and products. Ensure that there is a consensus within your group on this and that you’ve collected enough data to support your conclusions.

6. **Determine the coefficient on each substance in the chemical equation (small group).** Collecting more data if necessary, determine the coefficients of each substance in the chemical equation. To do this, focus on the amount of each substance consumed or produced when the reaction occurs. Aim for whole-number coefficients if possible (this is completely optional, but will focus the follow-up discussion). Ensure that there is a consensus within your group on this and that you’ve collected enough data to support your conclusions.

B. Stoichiometry and Solution Preparation: The Jello Problem
3. Specifications-based assignment: Primary Literature Summary

This assignment was administered as part of my Molecular Photochemistry course in Spring 2021, which uses a specifications grading model. The assignment prompt and an example of exceptional student work are included.

Assignment Prompt

A large bank of articles from the primary literature of organic photochemistry is here. To complete a Primary Literature Summary (PLS), choose one of the articles, claim it by adding your name in the bank, and starting from this template, write a summary of two to three paragraphs that describes the goals, outcomes, and significance of the work described. Additionally, relate the content of the paper to concepts we have seen in class. Include at least five tags: key words or phrases that describe the subfield, method, functional group, or other important metadata associated with the work. Submit your completed summary here. Summaries are due on Fridays at 5:00 pm and one PLS can be submitted per week.

A satisfactory PLS meets the following specifications.

- The template PLS is used as a starting point and minimally modified (this helps me organize submissions)
- The language used is understandable to a senior-level undergraduate student or first-year graduate student, avoiding excessive subfield-dependent jargon
- The goals of the work are accurately and completely described
- The most important results are accurately and completely described
- The significance of the work is accurately and completely described
- The summary includes a robust connection to at least one concept we have seen (or will see) in course materials
- Text is grammatically correct and properly formatted, including subscripts and superscripts, Greek letters, and mathematical equations via LaTeX or Equation Editor where appropriate

Exemplary Student Work, Primary Literature Summary

Title:

Visible-Light-Enabled Paternò–Büchi Reaction via Triplet Energy Transfer for the Synthesis of Oxetanes

Author(s):

Rykaczewski, K. A.; Schindler, C. S.

Reference:


Tags:
Summary:

The paper by Rykaczewski and Schindler titled *Visible-Light-Enabled Paternò–Büchi Reaction via Triplet Energy Transfer for the Synthesis of Oxetanes* proposes a new, simple, and more efficient method of synthesizing highly useful oxetane molecules via photocatalysis and Dexter energy transfer. The overall goal was to develop a safer and more effective photochemical pathway to creating these oxetane molecules that does not rely on higher energy UV light but instead visible light, which is a less explored area. The method finally developed in this paper improves on the traditional synthesis reaction of oxetanes, the Paternò–Büchi Reaction, by employing the use of a photocatalyst that excites under visible light irradiation. The Paternò–Büchi Reaction is a fairly simple method of synthesizing oxetanes, and traditionally involves the cycloaddition of a UV light excited carbonyl to an alkane, forming these oxygen containing heterocycles. Direct excitation of the carbonyl excites an electron into a pi* orbital, resulting in radicals on the oxygen and carbon of the carbonyl, which then undergo a cyclic addition with the alkene. The use of UV light is unsafe and limited in scale, but many carbonyl starting materials will not excite in the visible light spectrum. This is where a photocatalyst was found necessary for activating the carbonyl to then participate in a Paternò–Büchi Reaction.

For this experiment, a photocatalyst that absorbs visible light and populates its triplet energy state was necessary. This would then allow the photocatalyst and the carbonyl reagent to undergo triplet energy transfer, a type of Dexter energy transfer that we have learned about in CHEM 4801. Triplet energy transfer is a mechanism that, with a collision of two molecules, transfers an electron in an excited state of the donor molecule to that of an acceptor, while transferring a ground state electron of the acceptor to the ground state of the donor. This results in the donor returning to its ground state, and the acceptor being excited. For triplet energy transfer, the excited state is a triplet, and the triplet energy of the donor molecule must be close to but still higher than that of the acceptor for a successful energy transfer. For this reaction, glyoxylate derivatives were used as the carbonyl reagent in the Paternò–Büchi Reaction, as they have low triplet energies that will make triplet energy transfer from the photocatalyst efficient.

Many different glyoxylate derivatives and alkenes were studied as reagents in this experiment, but also various different photocatalysts, most iridium based, were used in order to vary their triplet energies. All reagents were irradiated with 456 nm light, negating the need for UV light irradiation in this experiment due to the addition of the photocatalyst. The results were successful, with the photocatalysts identified as most optimal being found to produce oxetanes at yields of 70% and higher after 30 minutes. The reaction was increasingly optimized with variations on the solvent, catalyst loadings, and alkene amounts. It was also found that catalysts with triplet energies lower than that of the glyoxylate derivatives produced no oxetane product, reaffirming the triplet energy transfer mechanism. The study then attempted to irradiate the glyoxylate and alkene reagents under UV-A light to compare oxetane formation by the traditional method with their new method using a photocatalyst, and the traditional method was only observed to have a 25% yield after 30 minutes. Thus, it was concluded that a new method for more safely and efficiently synthesizing oxetanes, via a visible light photocatalyst and a triplet energy transfer mechanism that creates optimal conditions for a Paternò–Büchi Reaction, was confirmed. This is significant, as visible light is safer and more accessible than UV light, as well as it allows for carbonyl reagents to be used that would not traditionally absorb visible light, as long as their triplet energies were low enough. As well as this, oxetanes have many uses in drug design and development, and are useful in pharmaceuticals for their biochemical and structural properties. Proposing a new method for synthesis of oxetanes may increase their usefulness and lead to improvements of products in these fields.
When the pandemic forced school to go online for the end of the Spring 2020 semester, the shift in course delivery didn’t bother me too much. When it also derailed my plans to study abroad over the summer, and then to take classes at GT, I was very annoyed. Since everything was under lockdown anyways, I decided to take some difficult classes for Summer 2020, one of them being CHEM 2312, Organic Chemistry II. It was synchronous, unlike the other classes I decided to take, which seemed like a bother at first, but actually turned out to be a really important point of connection for me while staying at home all day for so many days. Dr. Evans immediately approached the class with a surprising amount of technological literacy and flexibility, encouraging us, his students, to use Discord to discuss homework and tests or to direct message him whenever we needed. Most classes already create student GroupMe chats, where a substantial amount of fruitful discussion happens, but Discord allowed us to move that to a forum that includes the professor but still felt comfortable. He also integrated apps like Mechanisms and Chemistry by Design into the course curriculum. I felt like using those apps during class was a good way to stay engaged in the lesson and doing assignments on them was fairly easy but kept me thinking about the principles of organic reactions. Weekly homework assignments were challenging, so assignments overall were a good blend of depth and core concepts.

Along with adapting the Organic Chemistry II course to an online format on short notice, Dr. Evans is also just a very capable and engaging professor. His class requires students to watch some videos with course content beforehand, but they’re digestible, bite-sized chunks. His approach to teaching was very conducive to my learning: Dr. Evans’s main concern is for students to approach organic reactions systematically with the knowledge of as few fundamental rules as possible. In order to show us how to use these “tools” in our “synthetic toolbox”, we worked through a lot of examples from base concepts. Homework assignments served as incremental steps up in difficulty from these lecture examples. They were challenging but we were provided a foundation in class that I felt prepared us to take the next steps. Assignments always focused on getting us to recognize types of reactions and how they occur in “elementary steps”, then progressed to predicting and explaining the products of organic reactions and then open synthesis. The progression from simple to complicated within the same assignment has always been helpful to me, because if my knowledge from lecture has atrophied slightly, I can build it back up in the course of the assignment. Plus, those open synthesis problems were really fun for me because I liked utilizing the “synthetic toolbox” we built up throughout the semester. They were also great practice for the tests, which were definitely another step up in difficulty, but were structured similarly to the homeworks and so, I feel, set students up to succeed on the more difficult problems.

One thing I really appreciated about Dr. Evans’s class was his philosophy toward the internet. He told us at the outset that it was more important to him for us to know how to apply knowledge, because the knowledge itself will often be easy for us to access because of the internet. That levelling immediately put me at ease with Dr. Evans. He also told us that he
understood the tribulations and temptations of online classes, so his tests were always “open-internet”, and the responsibility of creating original, “cheating-proof” tests was his. From the beginning then, I think Dr. Evans was able to establish a great degree of trust between the students and himself, one that I felt lasted the whole semester. Along with his amiable demeanor and understanding, that trust really set the tone for the class and made it one of the more comfortable ones I’ve ever had. That comfort really facilitated my learning and solidified organic chemistry as my favorite discipline of chemistry, and Dr. Evans as one of my favorite teachers I’ve had at Georgia Tech.
Illustrations of Teaching Excellence and Impact on Student Learning

1. Syllabus Excerpts, Organic Chemistry II (CHEM 2312) in Summer 2020. Important educational technologies used in the course are highlighted in yellow.

Class Meetings
TR | 9:30 am – 11:40 am | Online via BlueJeans; see Canvas for links to class sessions

Goals
Upon completing this course, you will be able to...

- Apply a variety of qualitative reasoning strategies, especially probabilistic reasoning and reasoning by analogy, to predicting the mechanisms and products of organic reactions.
- Apply fundamental principles of catalysis, particularly acid-base catalysis, to describe catalytic reactions and solve problems involving catalytic reactions.
- Draw and analyze reasonable organic reaction mechanisms using the curved arrow formalism, the elementary-step framework, and structural stability factors.
- Design syntheses of relatively complex organic molecules from simple precursors using mechanistic strategies for synthetic planning.

Required and Recommended Materials

   Using an earlier edition of the Solomons text is fine but be aware that the chapter and problem numbers may differ. Problems from the textbook will only be suggested, not required. Readings will be assigned both from the textbook and from supplemental materials that I will provide on Canvas. Read my material first and then read Solomons!

2. Mechanisms: Organic Chemistry application (iOS/Android). (Required)

   We will use the Mechanisms app in class to solve reaction mechanism problems.

Course Websites
Supplemental readings, videos, practice problems, and other important course information will be posted on our Canvas site. Check the site daily for updates.

We will use Piazza as a course forum. Use Piazza as an opportunity to ask and answer questions about anything related to CHEM 2312. Keep in mind that teaching others is a great way to develop a deeper understanding of the concepts of the course. Using Piazza is particularly important in this term as the course is entirely remote.

For real-time communication with your classmates and Dr. Evans, we will make use of a Discord server. Download Discord and join our server at this link. You do not need to use your real name on the Discord server; if you are concerned about privacy, use a pseudonym.
ASSESSMENTS & GRADING
Course grades will be assigned based on points earned on preparation quizzes, homework, and exams. Points are distributed as follows:

Preparation Quizzes .............................................................. 200 pts.
Homework/In-class Exercises ........................................... 300 pts.
Midterm Exams ................................................................. 300 pts.
Final Exam ............................................................... 200 pts.

Letter grades will be assigned using the following ranges. To encourage mastery, the course will not be curved.

A................................................................. 1000 – 875 pts.
B................................................................. 874 – 750 pts.
C................................................................. 749 – 600 pts.
D................................................................. 599 – 450 pts.
F................................................................. 449 – 0 pts.

PREPARATION QUIZZES
Before each class period, a set of readings and/or videos will be assigned. These materials will introduce concepts relevant to the problems we will encounter in class. A short quiz based on these materials will be given via Canvas. Preparation quizzes are due at 11:59 pm on the days we have class (Tuesdays and Thursdays).

HOMEWORK/IN-CLASS EXERCISES
Eight homework assignments worth 20 points each will be assigned throughout the semester (see the schedule below). Homework will be distributed and submitted through Canvas and graded in Gradescope.

2. Selected comments from Course Instructor Opinion Surveys (CIOS)
CHEM 2312, Summer 2020
“Dr. Evans is an amazing professor. His care for students, especially during this crazy time, is above and beyond my other six professors during this summer. I really appreciated that he did not ignore everything happening in the world but addressed it with us, and was understanding of how it may impact our learning. He is also in general a great teacher—he explains things very well and really knows what he is talking about. Even if you don't love organic chem, you love Dr. Evans.”
“Dr. Evans youtube videos were very effective and made learning easy. The tests being open note made it a lot easier because I focused more on why things worked instead of memorizing mechanisms.”
“Dr. Evans is one of the best, if not the best professor I have had while attending Georgia Tech. Not only did he care about his students, but he was very clear that if students needed accommodations with COVID or the protests and BLM movement, he was more than happy to assist. I feel as is he genuinely cares about his students and wants us to do well. He was always able to offer advice on how to succeed in this course and would answer questions quickly.”
“Brilliance! I was blown away by Dr. Evans’ near-encyclopedic knowledge of the course material, which was further improved by his strongly enthusiastic, clear, and concise teaching style.”

**CHEM 1212K Laboratory, Fall 2020**

“Dr. Evans' greatest strength was his ability to explain the underlying chemical concepts in experiments in a clear, concise, easy-to-follow manner. I really appreciated Dr. Evans' videos linked in experiment protocols, as well as the written experiment backgrounds in the protocols. As I mentioned earlier, they were extremely helpful study tools. Dr. Evans explained concepts in an engaging way and used an abundance of helpful visuals. Dr. Evans was also very active on Piazza, helping to address student questions and concerns. Several of his explanations on Piazza helped me better understand chemical concepts before exams.”

**CHEM 1310 Lecture, Fall 2020**

“He could explain the concepts so well. I think he understands the ideas so well at their foundation and he can effectively communicate his interpretations on difficult concepts so that they are easier for students to relate to.”

“Dr. Evans was genuinely excited to teach this class, and he enjoyed explaining how each part of chemistry worked.”