2022 CTL Innovation in Co-Curricular Education Award Nomination:
Public Policy in Chemical Principles (CHEM 1212K), and Vice Versa

Prof. Jake D. Soper
School of Chemistry and Biochemistry
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To Whom It May Concern:

I write with great enthusiasm to nominate Associate Professor Jake Soper for the Georgia Tech 2022 Innovation in Co-Curricular Education Award. Over the past seven years, Dr. Soper has developed and implemented a novel curriculum that integrates public policy into an introductory chemistry course (CHEM 1212K, Chemical Principles II). This is fertile, if underexplored, ground in our curriculum, since chemistry is at the center of many problems and solutions in our larger society. To bring about this ambitious plan, Prof. Soper has pursued new partnerships with the Georgia Tech Honors Program and Serve-Learn-Sustain. By any metric, the program has been wildly successful, encouraging our students to stretch well beyond the bounds of a traditional general chemistry class by contextualizing the value of fundamental chemical principles in science communication, ethics, and policy making. The result is a course that materially enhances the teaching and learning environment, with demonstrated successes in producing students with ambitions of improving the world through scientifically informed governance and policy making.

A comparison to the traditional sections of the 1212K class is instructive. This is the second semester of the year-long Georgia Tech freshman chemistry sequence. It teaches fundamentals of chemical kinetics, thermodynamics and equilibrium, coordination chemistry, and descriptive chemistry. It is taken by all Georgia Tech science majors and many engineering majors. A typical section includes 200+ students. Since 2011, Jake has taught 1212K each fall semester. The fall section is "off sequence", meaning most of the students are newly arrived first-year students who placed out of Chemical Principles I (1211K). It is often their first class at Georgia Tech. After a few years in this role, Prof. Soper saw an opportunity to engage these students in a different and creative manner. He proposed to develop a small Honors Program (HP) section, which are expected to prioritize active learning and discussion that challenges students to "explore their intellectual curiosity across disciplinary boundaries." The novel idea was to incorporate a significant public policy component, focusing on governance, ethics, and communication at the intersections of science and sustainability, and the Honors Program eagerly agreed.

Three issues stood in the way. First, Prof. Soper lacked significant policy expertise, so he recruited a teaching assistant from the School of Public Policy to collaborate on the development and implementation of a series of modules, which would be delivered every other week (one out of every six lectures) throughout the semester. Secondly, since 1212K is a prerequisite for many other science and engineering courses with a dense curriculum standardized across all sections, excising one-sixth of the course material was not a trivial adjustment, requiring the creation of an independent section. Finally, this program carried real financial costs. Dr. Soper successfully petitioned the Honors Program for TA funding, and I was happy to support a request for Dr. Soper to be assigned to teach the small, additional section of 1212K. The new class was thereby born in 2015.

Over the past seven fall semesters, Prof. Soper has worked with three TAs from the M.S. in Public Policy (MSPP) program to create standalone policy modules, comprised of reading assignments, in-class debates, simulations, and pre- and post-unit assessment exercises, which introduce elements of policy and governance while simultaneously fulfilling core 1212K curriculum requirements. In one example, he and the MSPP TA collaborated on a module on aluminum manufacturing. The basic redox chemistry that is used to produce aluminum commercially is often covered in the electrochemistry portion of a general chemistry class. Here it was an entry to explore the far-reaching effects of tariffs and subsidies on community sustainability and national security. It is safe to assume this was the first time students in 1212K were asked to discuss Section 232 of the Trade Expansion Act of 1962.
The successes and benefits of this work have been easy to see. Letters from students, a few of which are included with this application, usually discuss how this program stimulated their interest in fields outside their majors and inspired interest in politics, policy, and science communication. One expressed "a profound desire to help improve the world through both avenues of policy and science", resulting in him becoming active in an on-campus policy group. Prof. Soper’s class brings additional tangible benefits to our School by offering a cohort-building experience for newly arrived Chemistry and Biochemistry majors, as well as giving us an additional presence in Institute educational initiatives, including the Honors Program and SLS. The value of Jake's course to the Honors Program is captured in the following endorsement from the Director of the Honors Program, Prof. Roberta Berry.

The Honors Program Living Learning Community (LLC) recruits highly motivated, curious, and creative students from all majors. Each year, we offer our students about 50 small, active-learning, interdisciplinary Honors Program classes, thanks to partnerships with faculty members and departments spanning the six colleges. Our curricular, co-curricular, and LLC experiences are designed to equip our students to innovate across boundaries—of discipline, theory and practice, culture and perspective—to improve and enrich their own lives and the world. Our mission also includes serving as an incubator for educational innovation to extend these benefits to students across the Institute.

Dr. Soper’s small, active-learning, interdisciplinary CHEM 1212K class exemplifies all that we strive to do. By his creativity, energy, and dedication, Dr. Soper has designed a class that powerfully connects learning about theory and practice in chemistry with learning about theory and practice in public policy and the related challenges of diversity in culture and perspective. Letters of support by students Liam Ordner, Jonathan Shaheen, and David Weinberg attest to the impact—both on their learning and on their lives as future professionals.

Dr. Soper has sustained this educational innovation by sustaining a cross-campus partnership with the School of Public Policy (SPP), enlisting Masters students (MSPP) to work with him to develop and deliver policy modules for the class. He has brought the benefits of this learning experience both to Honors Program students and to Chemistry majors, the Honors Program students benefiting from co-learning with students who bring deep disciplinary commitment, and the Chemistry students benefiting from co-learning with Honors Program students who bring diverse disciplinary perspectives. The benefits extend to those MSPP students who have enjoyed the distinctive opportunity to work closely with Dr. Soper as TAs for the class, experiencing the possibilities and results of designing and delivering this kind of enriched, innovative educational experience.

As student Liam Ordner writes, “Professor Soper, as my first college instructor, set a near-impossibly high standard for how I expect all courses to be conducted. Considering the success of the public policy module, I am surprised I have yet to see any similar implementations in other classes here at Georgia Tech.” Dr. Soper’s class serves as a model for opportunities to reach across campus, draw on the abundance of cross-disciplinary resources, and partner in educational innovation to equip our students to innovate across boundaries to improve and enrich their own lives and the world.

Prof. Berry's final sentence highlights the opportunities for transferability and sustainability that have emerged from this effort. The modules created for this class have been shared and reused in other general chemistry classes, and several elements have been adapted for the larger sections of 1212K. More broadly, Jake's success has revealed an untapped opportunity to utilize the tremendous breadth of expertise on campus to enhance learning for our undergraduates by making powerful connections between subjects that are traditionally presented as distinct or disparate topics. Furthermore, while Dr. Soper’s program is experiential, it does not require leaving the classroom, which can be difficult in many instances. Instead, he brings outside learning into the classroom experience as an essential feature. Expanding beyond the traditional definition of co-curricular, cross-disciplinary education offers an exciting opportunity for Georgia Tech to distinguish its first-year educational offerings from those of our peers.
The groundbreaking success of 1212K HP is a model for the types of course offerings we should be prioritizing and championing at Georgia Tech as we pursue our strategic goals of developing culturally competent, globally aware, and ethical leaders. The Innovation in Co-Curricular Education Award would be a well-deserved recognition of Prof. Soper’s accomplishment, and would emphasize the value of creative and innovative cross-disciplinary education at Tech.

Sincerely,

M.G. Finn, Ph.D.
Professor and Chair, School of Chemistry & Biochemistry
James A. Carlos Family Chair for Pediatric Technology
Public Policy in Chemical Principles (CHEM 1212K), and Vice Versa

Principal Investigator: Jake D. Soper
Co-Investigators: Dorraine Duncan, Kelly Tessier, John W. Anderson

Abstract:
A new cross-disciplinary curriculum developed and implemented for Chemical Principles II (CHEM 1212K) uses foundational chemistry as an entry to dedicated instruction in public policy. The broader implications of fundamental chemical principles are highlighted via case studies of policy creation and governance, ethics, and communication at the intersections of science and sustainability. A series of modules were created in collaboration with students from the M.S. in Public Policy (MSPP), with support from the Honors Program, Serve-Learn-Sustain (SLS), and the School of Chemistry and Biochemistry. Pathways for sustainability and transferability are discussed, which provide a detailed roadmap for expanded cross-disciplinary offerings that significantly impact the quality of undergraduate teaching and learning at Georgia Tech.

Hypotheses and objectives:
An intense focus on details and models in introductory chemistry courses comes at the expense of broad, meaningful connections that are essential for student engagement and learning. Expecting students to draw their own connections between their many, disparate classes and subjects of study is often a bridge too far. Dedicated instruction in public policy affords our students a tangible connection to the broader applicability of their chemistry education. Sustainability is a direct link between chemistry and public policy (Scheme 1).

Specific objectives include enhanced student learning and retention of foundational chemical principles; increased student classroom engagement and active learning; increased civic and community engagement; empowered graduates with the skills and motivations to make ethical, globally aware, and scientifically informed governance and policy decisions.

Intended audience:
Undergraduate students from the Georgia Tech Honors Program and B.S Chemistry/Biochemistry majors enrolled in Chemical Principles II (CHEM 1212K).

Description of the co-curricular initiative and approach:

Background. Chemical Principles II (1212K) is the second semester of a two-semester course that introduces foundational concepts of chemistry, including chemical kinetics, equilibrium principles, acids and bases, electrochemistry and coordination chemistry. The class consists of three 50 min lectures and one 1 h 40 min laboratory per week, the lecture and lab responsibilities are divided between different faculty members. Typical class sizes range from 190-240; the course is taken by ca. 700 students per year. Approximately 40% of each class are College of Sciences majors (CHEM, BCHM, BIOS, PHYS, EAS, MATH and PHYC). Other major groups include BMED, ChBE, MSE and CS.

In 2015, the PI proposed to develop a small (<40 student) section of 1212K that could serve as a testbed for integration of policy content with the objectives listed above. The Honors Program's (HP) small, discussion-based classes, with expectations of high levels of student and faculty engagement and an emphasis on interdisciplinary education, made them an ideal partner. A proposal to the Honors
Program and the School of Chemistry and Biochemistry to create CHEM 1212K HP in Fall 2015 was approved and renewed every fall semester through Fall 2020. In each section, approximately half of the available seats were taken by Honors Program students; the balance were filled with B.S. CHEM or BCHM majors.

Implementation. Producing high-quality policy content demands policy expertise. HP funds were used to recruit a full-time TA from the M.S. in Public Policy (MSPP) program in the Georgia Tech School of Public Policy. Three MSPP TAs (listed as co-investigators above) have each made substantive contributions to the class over the past six years. The general working relationship has remained the same. The MSPP TA attends each lecture and meets weekly with the PI to review and game plan strategies for the creation and integration of timely or compelling policy content into the 1212K curriculum. Biweekly "Policy Friday" lecture periods are allocated to policy modules, which are designed to use chemical principles as a launch pad for discussions of public policy, ethics, communication, and governance, often centering on sustainability, broadly defined. The in-class exercises are typically led by the SPP TAs, with an emphasis on interactivity and active learning. In-class activities are complemented by pre- and/or post-assignment readings and reflection or literature research exercises designed to test comprehension and challenge critical thinking. Specific examples are provided below.

An additional note on curriculum integration is merited. 1212K serves many campus constituencies and is a prerequisite for many other classes. The course schedule is dense and standardized across all sections. One-sixth of the chemistry content cannot be removed without significantly disadvantaging those students going forward. Accordingly, extensive efforts were invested in seamlessly integrating the policy content into the curriculum with minimal disruptions to the standard course schedule. This demanded that the policy modules inform chemistry education, and vice versa.

Co-curricular content. Modules have evolved or been replaced entirely as individual MSPP TAs have brought their own interests and expertise. Three are summarized below to highlight the breadth of policy content as well as their integration with the traditional 1212K curriculum.

Example 1: Chemical kinetics vis-à-vis catalytic converters and the clean air act. Catalysis and reaction kinetics are the first subjects covered in 1212K. Prior to the first day of class, students are charged with researching the pricing and availability of precious metals, which, they learn, do not correlate with natural abundance. Prices of palladium and especially rhodium are driven by demand for the precious metals in automobile catalytic converters, which are mandated by the EPA/Clean Air Act of 1970. The history of the EPA is discussed. Documerica is reviewed in the context of modern efforts to influence public opinion on environmental issues. The role of the EPA in addressing global climate change and CO₂ emissions is debated.

Example 2: Electrochemistry, aluminum production, and national security. Commercial aluminum production is accomplished via the Hall-Héroult Process, an electrochemical (redox) process, which
is briefly discussed in most general chemistry texts. Here aluminum production is used as an entry to discuss its significant energy demands, which directly impact where and how much it costs to produce. Accordingly, most aluminum manufacturing has moved to countries with abundant, cheap energy and less expensive labor. The U.S. Military relies on high-quality aluminum for production of warcraft, and closure of domestic smelters is a source of great economic strife some communities. Students are asked to consider and debate the merits of tariffs and subsidies in the context of community and environmental sustainability, economic policy, and national security. Section 232 of the Trade Expansion Act of 1962 is introduced, and its use by lobbyists and consultants as a tool to influence policy making and public opinion is demonstrated in a real-world case study.

Example 3: Glyphosphate in breakfast cereal, science reporting, and victim's compensation. The acid-base properties of many pharmaceuticals and agrochemicals is the starting point for a case study of popular press reports on herbicide contamination in Cheerios and Quaker Oats. Students are walked through the reporting processes for peer reviewed scientific publications vs. a popular new article. The roles of advocacy groups in setting public opinion and policy are interrogated via an investigation of the mission and public tax disclosures of the Environmental Working Group. The means by which government agencies establish chemical safety thresholds are discussed. The students are then asked to listen to a podcast on a "special master" mediator named Ken Feinberg and answer a series of essay questions on damages, victim's compensation funds, and the merits of legal vs. moral resolutions to politically charged disputes.

Description of how the initiative has been evaluated:

Combined quantitative and qualitative measures suggest the program has been highly effective in all of the specific objectives listed above.

First, proficiency in policy-specific metrics is strong. During the Fall 2018 semester, performance on the public policy free response exam questions increased from 52% on midterm 1, to 94%, 98% and 97% on midterms 2, 3, and the final exam, respectively. Second, students in 1212K do not suffer from a lack of focus on chemical principles. Each fall semester between 2015 and 2018, the PI taught two sections of 1212K—an HP section with the policy emphasis (30-44 students) and a traditional, large
section of 1212K (190-219 students), which served as a control. Exams were identical in the two sections, aside from one policy-specific question on each HP section exam. The HP section outperformed the large class by 5-10% on each exam, and their final average GPA was significantly higher: 3.61 HP vs. 3.28 non-HP. Admittedly, this is not an apple-to-apples comparison. In addition to the benefits of a smaller class size, the HP section was (self) selected for their academic ambition, motivation, and/or interest in chemistry. However, it's worth noting that they did not find the PI inherently more "effective" as an instructor. Average CIOS scores were statistically indistinguishable across all sections.

There are strong anecdotal indicators that the program was effective in stimulating interest in chemistry as well as policy. A significant fraction of students in the HP classes were noticeably apprehensive or dismayed when they were first told of the planned policy integration; this turned into palpable enthusiasm for Policy Fridays as the semesters progressed. Several claimed it was their favorite part of the class. Letters provided by three students from the 2019 cohort (included in this nomination) all cite the links between real-world applications and fundamental principles as beneficial for their learning. One wrote that "This exposure helped solidify in me a profound desire to help improve the world through both avenues of policy and science." This claim is backed up by his subsequent decision to join a policy group on campus.

Finally, the success of this program engendered a natural partnership with Serve-Learn-Sustain (SLS). The HP section of 1212K has maintained SLS affiliation since 2016, which has served to further emphasize the importance of science in policy for development of sustainable communities via an affiliated suite of course and projects. Many students have pursued these opportunities as a direct result of their initial exposure to SLS in this course.

**Sustainability and transferability:**

As currently constituted, the policy-centered approach to 1212K can be maintained indefinitely. A suite of ca. 15 modules have been created and archived for future use. These undoubtedly benefit from the active contributions of an MSPP TA, but a curious, willing instructor can pick up enough policy knowledge to achieve many of the same outcomes. The modules themselves are not specific to 1212K or a small Honors Program course. Elements have already been adapted for use in larger sections of 1212K and could be ported to General Chemistry (CHEM 1310) with minimal effort.

The long-term impacts of this initiative are significantly larger, in both scope and number of students impacted. This demonstration of the power of truly cross-disciplinary education on student learning is entirely replicable. As Prof. Berry highlights in her contribution to the nomination letter, the abundance of cross-disciplinary recourses on campus provides an untapped opportunity to innovate the methods by which we educate and equip our students to enrich their own lives and the world. Expansion opportunities are limited only by the imagination and creativity of empowered faculty. What could a graduate student TA from the School of Chemistry and Biochemistry bring to an Applied Physiology course? How might a TA from the School of Music enhance a Freshman math class? This program provides a detailed roadmap for cross-disciplinary teaching that distinguishes the educational offerings of Georgia Tech from our peers while fully aligning our teaching efforts with our strategic plan goals of producing students who are prepared to lead as ethical and socially conscious global citizens.

**Acknowledgements:**

Policy modules were developed in collaboration with the MSPP TAs Dorraine A. Duncan (2015-16), Kelly Tessier (2017) and John W. Anderson (2018-2019). Intellectual contributors include Prof. Kenneth R. Brown (Duke U) and Prof. Roberta Berry (GT SPP). Financial support is acknowledged from the Honors Program (2015-2021), Serve-Learn-Sustain (2016-2021), and the School of Chemistry and Biochemistry (2015-2021).
Georgia Institute of Technology  
Center for Teaching & Learning  
ATTN: Dr. Joyce Weinsheimer  
Georgia Institute of Technology  
Atlanta, GA 30332-0383

Dr. Weinsheimer and Center for Teaching & Learning colleagues,

I am writing to offer a wholehearted recommendation for Dr. Jake Soper’s nomination to receive the 2022 Innovation in Co-Curricular Education Award. This award would be a worthy acknowledgement of his groundbreaking efforts to provide an enriching educational experience to his students in CHEM 1212K: Chemical Principles II. As one of Dr. Soper’s teaching assistants in 2018 and 2019, I had the privilege of both observing and assisting with his successful efforts to take his students on an educational journey that reached beyond the fundamentals of chemistry. Dr. Soper’s incorporation of public policy topics into this class convinced at least one student to pursue an additional degree program at Georgia Tech. I imagine many others have, and will continue to, pursue additional liberal arts studies on top of their STEM curricula. Dr. Soper has found a way to open the door to a multifaceted educational journey that will surely produce impactful results, as his students tackle myriad societal challenges in their careers beyond the campus.

Dr. Soper conceptualized and executed a plan to ensure his students viewed chemical processes not simply for what they were, but also for their societal implications and potential to resolve real challenges outside a laboratory setting. I was fortunate to join him as a teaching assistant, with sponsorship from the Serve-Learn-Sustain (SLS) program, to focus on this effort. The task Dr. Soper chose to pursue was simple, yet daunting. How to not only educate, but inspire students so that they actively care about the societal implications of foundational chemistry?

Dr. Soper’s mission resonated with me. Before enrolling as a graduate student in the School of Public Policy’s Cybersecurity M.S. program, I had worked as a policy and investigations consultant in Washington, DC, mostly dealing with regulatory matters on behalf of energy and mining companies. During my career in D.C., from 2016 thru mid-2018, I learned that the policy world is shaped by the competing forces of facts and perceptions. Whether litigating how a pipeline exploded or debating the merits of proposed legislation, strong scientific analysis is an essential component of almost every national policy or legal debate. Dr. Soper had a desire to see his students not only become scientists, but also motivate them to use their technical prowess to advance positive contributions to society.

I would like to emphasize the extraordinary outcome Dr. Soper’s program achieved, relative to that of a typical chemistry class that does not incorporate public policy topics. The general expectation of a chemistry student would be to study a topic such as electrolysis, and then demonstrate an understanding of how electrolysis works. This is adequate for that student to later pursue metallurgical research in a laboratory, a likely outcome for many chemistry students. But Dr. Soper wanted to take subjects like electrolysis and go two steps further with his students. First, he wanted them to develop an understanding of the costs and consequences incurred when a process
like electrolysis is deployed at massive volumes in an industrialized economy. This level of understanding is required for appropriately viewing major economic and national security policy conundrums related to electrolysis. Second, Dr. Soper wanted his students to understand how to present the chemical realities of electrolysis in a policymaking setting. Explaining to a non-scientific audience how societal problems are rooted in scientific challenges – and what possible solutions exist – is critical to advancing scientifically sound legislation and regulation. Dr. Soper challenged his students on their exams to concisely and eloquently approach various topics in this manner. Most students were heavily challenged by policy-related exam questions early in each semester. Yet many demonstrated strong progress and new cognitive ability as the semester progressed, especially on the exam questions that required short essay responses on policy-related topics. Dr. Soper succeeded in pulling off a true transformation in his students’ mindsets and capabilities.

In addition to the intellectual benefits that students reaped from this program, many also developed new personal curiosities and passions. Most college students develop a strong sense of engagement and rapport with a handful of professors at some point in their academic journey. I had the privilege of observing many of Dr. Soper’s CHEM 1212 students become increasingly active in his class discussions and office hours throughout each semester. His students became more willing to ask pointed questions of us and even openly debate topics of economics, ethics and various policies as each semester progressed. One student, who chose to remain anonymous, wrote a “Thank-A-Teacher” letter to us at the end of a semester, saying she had chosen to pursue a minor in Public Policy in addition to her STEM degree, to continue learning about policy topics after becoming enamored with several policy areas during the course. While she was the only student who confirmed this additional pursuit to us in writing, I would imagine that several others have broadened their academic pursuits as well. Several inquired with Dr. Soper or myself about possible classes they ought to consider taking to explore policy areas more, especially political, environmental and public health topics.

Dr. Soper’s initiative to incorporate public policy into CHEM 1212K successfully encouraged students to explore new areas of academic inquiry both inside and outside his classroom. In my eighteen years of formal education, I have rarely encountered a teacher or professor who could so effectively and innovatively forge the analytical, entrepreneurial and leadership energies of his students to propel them towards future achievements. I have little doubt that Dr. Soper’s CHEM 1212K students will someday make exceptional contributions to society. He has devised a program that enables students to start “Creating the Next” innovations and solutions that will be of great value. As an observer of his work for two years and the impressive outcomes, I fully endorse his nomination for the 2022 Innovation in Co-Curricular Education Award. I hope that the recognition of his work through the award will encourage other Georgia Tech faculty to model their teaching efforts after his.

Sincerely,

John W. “Jack” Anderson
M.S., GSEC, GCIH

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I came into Dr. Soper’s CHEM 1212K class having succeeded in AP Chemistry, but I was prepared for one of my first college courses to be difficult. It was difficult, but Dr. Soper’s engaging and insightful instruction along with the increased depth of course material made 1212K very worthwhile for me as a chemistry major. I also came into the class having only a passing interest in public policy and was a little bit put-off upon learning that we would be taking time away from chemistry to learn about it, especially in a dense course. To my pleasant surprise, our policy TA Jack was an engaging lecturer as well, and presented a variety of topics and issues that were interesting and reflected the concepts we were learning. Timely comments from Dr. Soper also helped solidify those connections. I found myself really enjoying the change of pace during those policy lectures, as well as the practical applications, which is something I’ve always searched for when learning science. The close interplays we discussed between research and industry, economics and international relations, agriculture and scientific journalism piqued my interest in other fields, but I wanted to pursue those interplays and bridge those gaps.

I left Dr. Soper’s class with a greater understanding of why those in politics should care about science and why those in science should care about politics.

A few things from the policy modules stick out in my memory of Dr. Soper’s class. We had three in particular that interested me: a module about the Clean Air Act and catalytic converters; one about scientific research and journalism with regards to glyphosate in cereal; and one about the aluminum-manufacturing industry and the domino effects of international politics on local economies. These three modules each interested me in their own ways. Learning about catalytic converters and the response to the Clean Air Act stimulated the environmentalist in me. Seeing the pitfalls of conducting and reporting science with bias made me cringe as someone who holds communication in high regard. Discovering that tariffs on, trade wars with, and faulty plane parts from China could impact a small but important industry, and a community on the Ohio River that relies on it, made me appreciate political intrigue and humanity at the same time. But all three of these modules also revealed to me some universal truths. Science - though it may seem unbiased, logical, self-concerned, or removed - is not infallible. It is intractable from the society within which we live, work, and govern. Science has helped us to destroy the environment, and it will help us heal it. Science is beholden to the rules of economics; it can be expensive or cheap, it can create or destroy jobs, it can suffer or gain in a market from external forces. Science is also confusing and scary because people don’t understand it, but it doesn’t have to be if we can communicate it effectively to as many people as possible.

Those truths are not difficult to understand and are fairly apparent to many who conduct science. I understood that these things were important before taking Dr. Soper’s class. General chemistry concepts are typically also not particularly complex, though 1212K was not necessarily an easy course. I still learned a lot of new things and was able to crystallize more familiar concepts throughout the semester. But the real, unique, revelatory takeaway from Dr. Soper’s and Jack’s teaching were the specific examples that showed how science is integrated into society. Seeing these connections exposed me to the possible tangible impacts a deep
understanding of science can have on people and the world we live in. This exposure helped solidify in me a profound desire to help improve the world through both avenues of policy and science. Were it not for Dr. Soper’s course, I may have despaired over the point of earning a chemistry degree in the wake of the events of Summer 2020. Instead, I knew the directions I could choose to put my efforts in. I’ve joined an on-campus group that discusses policy proposals from the university to national level and I’ve begun the process of seeking out undergraduate research opportunities with an eye towards using synthesis to improve sustainability. I think these things are a direct result of what I learned in CHEM 1212K, so I can say confidently that it’s a class that has made an impact on at least one student.

David Weinberg
3 February 2022

Dear Selection Committee,

My name is Liam Ordner. I am a second-year chemistry major at Georgia Tech, and a former student in Professor Jake Soper’s CHEM 1212K lecture. It is with great pleasure that I would like to recommend him for the 2022 Innovation in Co-Curricular education award.

In the Fall Semester of 2019, I walked into my first-ever college lecture with a very limited idea of what to expect. I was nervous on several accounts – including, but not limited to, the difficulty of the material and the quality of instructor. But these concerns were almost immediately put to rest upon listening to Professor Soper’s introductory lectures. The ease and enthusiasm with which he was able to explain the increasingly complex course material was truly admirable, and never ceased to keep me engaged in the class.

As a chemistry major, I knew I would enjoy this class from the beginning. Several of my classmates may not have shared the same sentiment, though. Chemistry is a notoriously difficult, and frankly, disliked, subject among many. One of the most common reasons for this lies in students not recognizing how applicable the subject matter truly is. Professor Soper clearly recognized this, so in addition to his lectures, he implemented a “public policy” module – designed to enrich our learning experience by providing relevant examples of the role chemistry plays in developing laws and policies. I often found these discussions to be the highlight of my week, even despite my investment in the rest of the course material. The topics covered in these discussions spanned from vehicle emissions to medical school applications, and there was something in each discussion to be both learned and appreciated by everyone in the class.

Professor Soper, as my first college instructor, set a near-impossibly high standard for how I expect all courses to be conducted. Considering the success of the public policy module, I am surprised I have yet to see any similar implementations in other classes here at Georgia Tech. By taking the subject material and augmenting it with his own passion, humor, and expertise in inorganic catalysis, Professor Soper managed to make every lecture both entertaining and worthwhile. An aspiring professor of chemistry myself, I will undoubtedly be taking inspiration from Professor Soper throughout the remainder of my career. I can think of no better candidate for this award.

Sincerely,

Liam Ordner
To whom it may concern,

My name is Jonathan Shaheen, and I am currently a third-year student at the Georgia Institute of Technology. In the fall of 2019, I had the privilege of being enrolled in Dr. Soper’s Honor’s Program section of CHEM 1212k – which had an emphasis on how chemical principals are involved in the formation of new policy. This being one of my first classes at Tech, I was not able to immediately appreciate the effects of Dr. Soper’s modifications to the course on the overall learning environment within the classroom. However, now that I have had many more classes at the institute, it is clear to me that the addition of public policy aspects to this class not only helped to make the chemical principles portion of the course more engaging, relatable, and understandable, but also served to promote several of the SLS goals. By encouraging students to consider how chemical principles could be applied to outside situations and raising awareness about the bureaucratic barriers that can prevent science from being implemented into policy, Dr. Soper’s course helped me as a student to better understand how science can be directly applied to limit the ecological impact of our day to day lives and how we as scientists must navigate regulations and public opinion for our work to be effective in the political realm.

To fully understand why I appreciate what Dr. Soper is doing here so much, I think it is important for me to explain my history with policy. For the last 6 years I have been intimately involved in the governance of a 401(c)3 non-profit organization known as Ga-Swimming -- including 2 years serving on their board of directors and an additional 2 years serving as a national athlete representative on the USA Swimming Open Water Development committee. During this time, it has been one of my goals to get as many athletes as possible involved in the day-to-day operations of GA-Swimming. The thought process being that the more athletes are involved in creating policy the better that policy will be at meeting the needs of the athletes. In trying to achieve this goal for swimming, I quickly realized that athletes were not participating not because of a lack of desire or a lack of interest but mainly because of a lack of understanding as to how the process worked or that the process even existed. Once I came to this conclusion, I focused most of my efforts on education of athletes and I quickly saw that they became much more engaged and eager to contribute. Although I did not recognize it right away, Professor Soper’s implementation of policy units into biweekly meetings served much of the same purpose. A couple of units that I remember specifically standing out to me were the presentations on Catalytic Converters, Monsanto (Glyphosate/Round-up), and Aluminum production in the US.

The presentation on Catalytic Converters came in our discussion of reaction kinetics and effectively achieved the SLS goal of drawing the link between ecological, social, and economic systems. A part of this unit focused on a discussion about what the most valuable metals were and what caused their value. In this discussion, we concluded that some of the most valuable metals are catalysts and their value has gone up a lot since regulations such as the clean air act made Catalytic Converts mandatory on all vehicles. In this same discussion about the events that lead up to the passage of the clean air act, it was noted that social awareness initiatives such as Documerica by the EPA helped to create a more educated public to accept these news
regulations. It was through this discussion that Dr. Soper and TA Anderson helped to demonstrate the interconnected nature of these various aspects of policy creation. The next particularly memorable discussion for me centered around public perception of the company Monsanto and their product “Round-Up.” In this discussion, we looked at a video from a PR firm lobbying against the use of “roundup-ready” crops for food grade products. We took a deeper dive into the people behind the PR firm, the validity of their claims, as well as the politics surrounding regulation. This module stood out to me because of my past working in landscaping – where I applied glyphosate often – and because of my interest in lobbying groups. By showing the perspective of the PR firms as well as the EPA, it helped to demonstrate the subjective nature of politics and how it can oftentimes convolute scientific outcomes to push an agenda. In this case, the two sides reached vastly different opinions about the safety of glyphosate in food despite having the same data available to both. Understanding this as a scientist I think is vital to keep in mind when publishing your work to be sure your results are not taken out of context to mean something that they do not. Lastly, the production of Aluminum through electrochemical processes not only helped me to understand the inner workings of galvanic cells and redox reactions, but also how special interests outside of free market forces can influence supply and demand. In the case of aluminum production, national security interests about whether we could source enough high-quality aluminum for defense during wartime were driving a push for the government to subsidize aluminum production in the US. This could potentially lead to more research into electrochemical reactions and the development of new, more cost-effective production methods for aluminum. This example showed how outside forces such as economic viability and national interest in the outcome of research can directly influence what scientific projects get funded and how much priority they are given. Again, I think this is something important to keep in mind as a scientist when deciding what research to go into and how it will benefit the community.

As I have shown above, I feel like Dr. Soper’s implementation of relevant policy into CHEM 1212k greatly enhanced my learning experience by simultaneously linking the in-class concepts to real world use cases and helping us to understand the interplay between political, societal, and scientific driving forces in the creation of new policy. Through these modules, Professor Soper helped me to see how science can be used to support sustainable initiatives while also helping me to understand that policy is multifaceted, so if we as scientists want our developments to meaningful, our presentation of them must be multifaceted as well.

Thank you,

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