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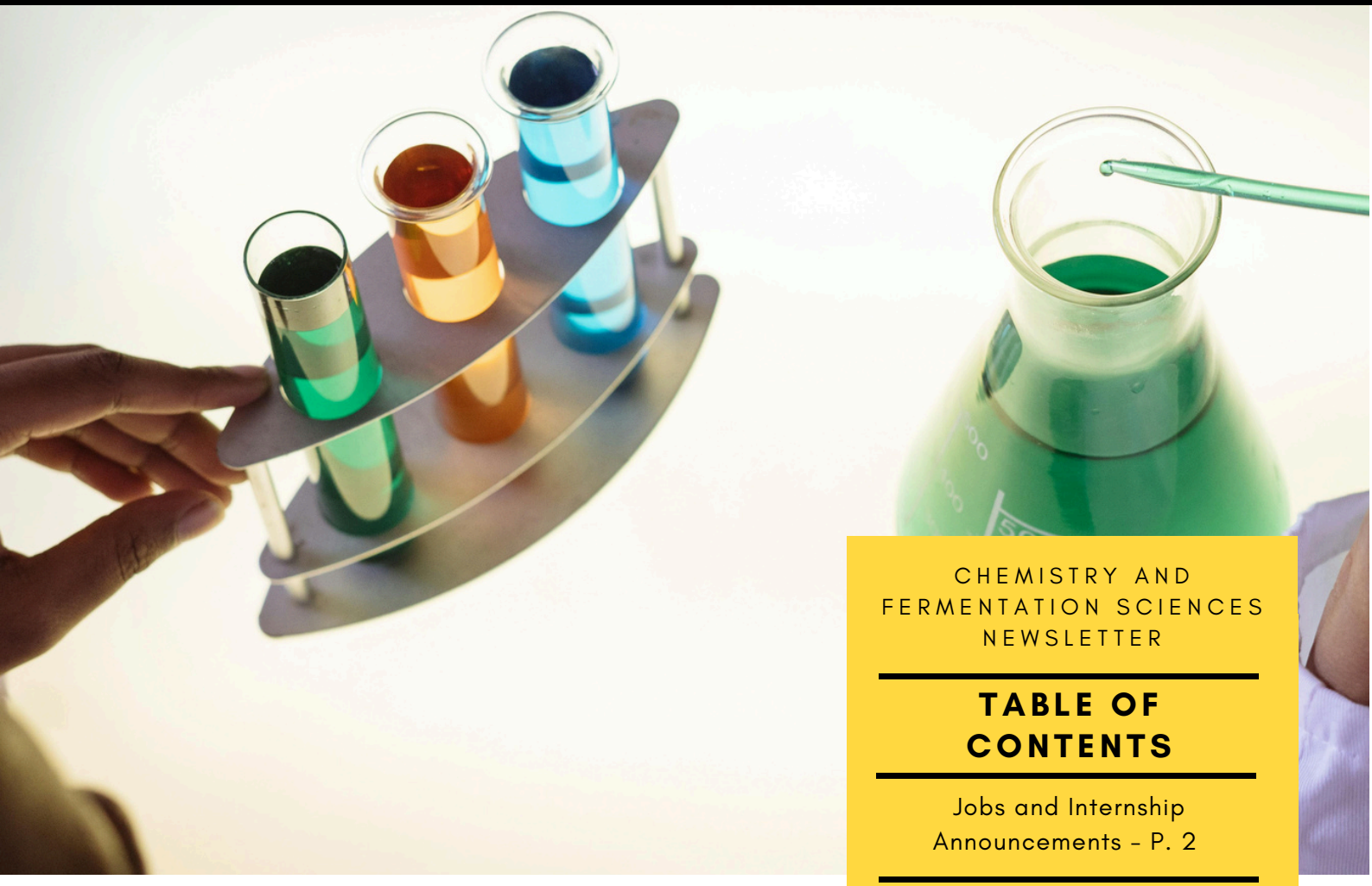
Department of Chemistry and Fermentation Sciences

THE PERIODIC TIMES

STUDENT NEWSLETTER - EARLY FALL2025



CHEMISTRY AND FERMENTATION SCIENCES NEWSLETTER

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WELCOME!

BY ISAAC PARSONS

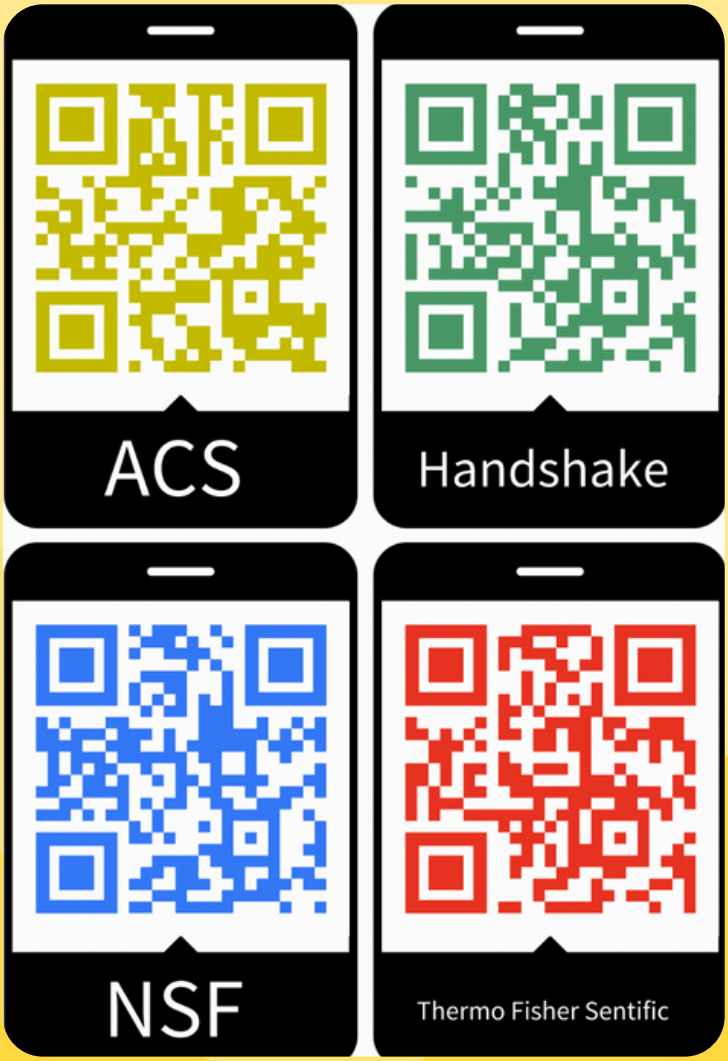
Welcome to the Early Fall 2025 Edition of the Periodic Times! This newsletter contains news about what is going on in the Chemistry and Fermentation Sciences Department at App State, as well as beyond. This newsletter offers information about internship and job opportunities, interviews with faculty and alumni, as well as updates regarding the ASU Chemistry Club. This newsletter was made by students and for students, and we hope that you find this newsletter enjoyable and helpful!

JOBS & INTERNSHIPS

BY HARLIE HODGE

Are you interested in building your resume or finding a job?

Internships are a good way to acquire technical skills, experience, and a professional network. You may not know where to look for or where to apply for them. Below are QR codes to websites that can help you find internships and job opportunities.



PROFESSIONAL DEVELOPMENT CORNER

BY ABIGAIL ZIMMERMAN

REFRESH YOUR RESUMÉ[2]

Not sure where to start with your resume? You're not alone! Your resume is one of the most important tools in your job or internship search, and the Career Development Center is here to help. Students can stop by the Career Studio during walk-in hours for feedback, formatting guidance, and personalized career advice. The Career Development Center also provides free professional headshots and access to the Mountaineer Free Store in East Hall, where students can find professional attire for interviews.

OPPORTUNITIES ON HANDSHAKE[3]

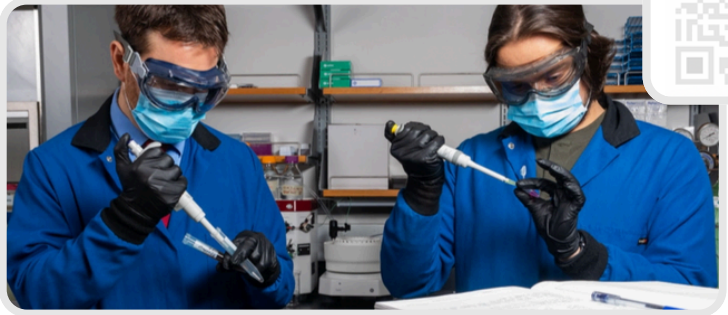
Looking for internships or jobs? Handshake is a university supported platform that connects students directly with employers. You can build your profile, browse open positions, and sign up for upcoming career events. It's a great way to discover on campus positions, internships, or networking events you might not have heard about!

PLANNING FOR GRAD SCHOOL[2]

Thinking about graduate school? Start by exploring programs that match your interests and career goals. Attend info sessions, talk with faculty or current students, and take advantage of campus resources like the Career Development Center. Planning ahead can make the process feel less overwhelming.

NETWORK & CONNECT[1]

Making professional connections is an important part of career growth. Talk with classmates and professors who share your interests. Going to campus events, career fairs, and guest lectures is a great way to meet people in your field. Networking isn't just about finding a job, it's about learning from others and exploring different career paths. Every conversation can teach you something new or open the door to an opportunity you hadn't considered.



BY JACOB WILLIAMS

CLUB NEWS

Fermentation Club

Not only concerned with aging wine, Appstate's Fermentation Club can be a fun place to learn to cook, too! For students wanting to broaden their horizons in the kitchen, save the date for a sausage, saurkraut, and mustard workshop happening November 25th in Mt Laurel hall! Other activities common for the fermentation club include panels with graduates, brew days, and more! For more information on upcoming events or their involvement in the famous High Country Beerfest, use the QR code below to access their instagram for the latest in ebullition expeditions!

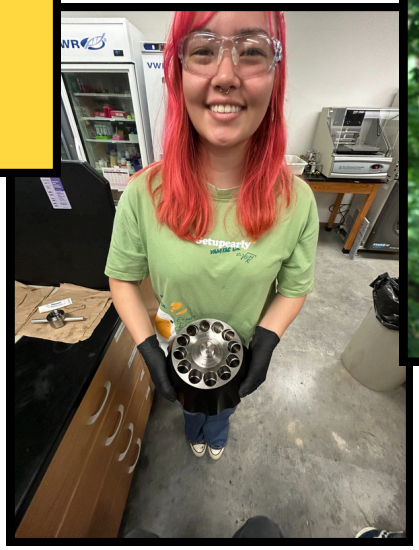
Appalachian Chemical Society

Are you in chemistry to blow things up and light things on fire? Are you interested in the practical uses of chemistry one might find in soap-making? Or are you looking for knowledgable insight into the real industry that awaits chemists post-graduation? For all the above and really cool sweatshirts, consider joining the Appalachian Chemical Society! Not just limited to chemistry majors, the ACS provides students with the opportunity to join a close-knit group of peers with various interests, backgrounds, and hobbies that engage in chemical activities just as variable! For more information, use the QR code below to stay up to date with all upcoming events and meetings!

STUDENT NEWS

BY SARAH TUCKER

THE PEOPLE BEHIND THE PROCEDURE: THE REDDISH LAB



Left: Milani Crozier, Junior, Biochemistry Concentration
Top: Lena Dobill, Junior, Forensics Concentration

Not pictured: Dominic Harding, Junior, Biochemistry Concentration

Q: Briefly describe your research.

Milani: Replacement of the Fe^{2+} in the porphyrin ring of Cytochrome P450 27A1 with other metals.

Lena: I study the electron flow of adrenodoxin to adrenodoxin reductase to a reporter enzyme, cytochrome c, to see the activity of adrenodoxin.

Dominic: Using fluorescence to observe the stability of Cytochrome P450 27A1 by itself and with its redox partner, adrenodoxin, under different conditions.

Q:How has being a part of the research lab helped you grow as a scientist and/or person?

Milani: It's made me more inquisitive about things outside of the lab. It has also made me more appreciative of collaborative work.

Lena: I have learned a lot about biochemistry from the lab. I feel like I have made great personal connections, which helps as a scientist because we all have different projects, and I can learn about the science behind what others are doing. Also, I appreciate my coworkers! Seeing their work ethic and kindness helps me grow as a person.

Dominic: It has given me a lot of real-world experience with things we talk about in class. The mindset of being in a lab has also translated well to studying--it's made me more driven.

Q:What's the hardest class you're currently taking? What advice would you give to a student taking it in the future?

Milani: Inorganic chemistry. Read the textbook. There are two of them, which is really helpful.

Lena: Inorganic chemistry. Take it seriously! I haven't put as much effort into it because I was more worried about physical chemistry and other classes. I feel like I wasn't prepared for the difficulty:

Dominic: Physics II. My best advice is to read the textbook. Even if you don't usually read the textbook, reading this textbook makes everything easier to understand.

Q:What's one non-chemistry event happening in your life that you're excited about?

Milani: My club (Asian Student Association) is doing a charity gala for an Asian-based marine society.

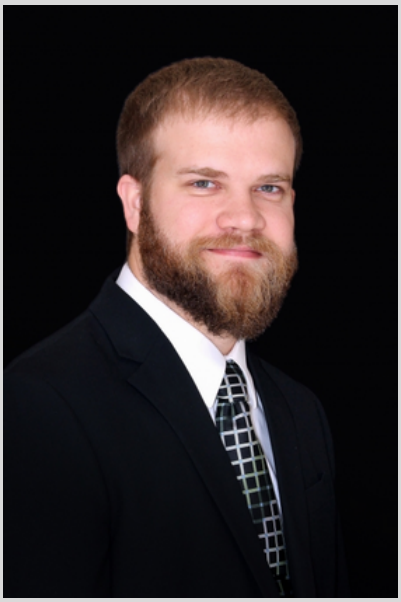
Lena: I'm really excited about an RA event that I'm trying to make happen. I'm partnering with the App State Police Department to do a drunk goggles Mario Kart night. This will raise awareness about drunk driving.

Dominic: There's a big UFC event happening in two weeks. I'm excited to see who wins the main event.

FACULTY SPOTLIGHTS

*Responses have been edited

BY HARLIE HODGE



Dr. Christian Wallen

Assistant Professor | Research Mentor

Q: Can you tell me a little bit about yourself and how you got started in chemistry?

"I started kind of seriously in chemistry. I was homeschooled, but was the equivalent of a high school junior when I took chemistry one at a community college. I did that because I wanted to apply for a program at Vanderbilt University, that is for rising high school seniors to do research with graduate students. I was accepted into the program the summer before my senior year and spent 6 weeks working at Vanderbilt in a chemistry lab. That was really cool [and I] was able to continue working in that lab through my senior year of high school part time. Since I did it for a whole year, [I did] enough work to be included in a publication. So I actually had a paper going into college. In that lab, that's when I decided to get a PhD in chemistry and become a professor."

Q: I know you're an inorganic professor. How did you get into that specific part of chemistry?

"In college I took just about every chemistry class that my college offered [and] had decided that my favorite was organic and I wanted to do organic research in graduate school. I went to Emory and they did rotations, they were pretty long when I started. I actually started in the summer and my first rotation was in an organic research lab. They were doing catalysis, but with rhodium complexes. So it was organic, but with metals… In my first semester I was taking basically physical organic chemistry as a graduate level course, and then like organic spectroscopy. Then I took something like chemical bonding and it was basically inorganic but it's bonding models. It's a lot like the inorganic we teach here, where it's symmetry and molecular orbital theory just kind of deeper and more advanced. I was taking those three classes in that first semester and I was enjoying all of them. I realized as I was taking that advanced bonding course that I was much more excited about that because it's very fundamental. It's like, how do the molecules work? How do they come together and how do they react?…I realized I might want to switch a little bit. The professor that was teaching my advanced bonding course was another research professor and I did my third rotation with him. Taking that class and then doing my rotation in his group is similar to how I've set up my group. We do organic synthesis, we make organic ligands, but then we put them on metals. Then we study fundamental reactions, fundamental characteristics of those compounds…The groups I was interested in kind of had a foot in each world. That's how most chemistry research is. These students and professors do a combination of lots of things. They're using lots of techniques, models, and different areas of chemistry. It didn't really matter to me which one I fell into."

Q: What are some of the achievements or milestones you are proudest of in your career?

"My graduate research was focused on the coordination chemistry of hydrogen peroxide. Which sounds pretty simple and in some ways it is. Can we take hydrogen peroxide and put it on a metal? But no one had done that before… [In another group], a really great inorganic chemist published a paper about how they made this porphyrin compound that's super receptive to ligands and tried to get hydrogen peroxide to bind to it and it would not…[But] we figured out how to make this work, and we know why that one didn't work… I did it and I have the only crystal structure of hydrogen peroxide and H2O2 bound to a transition metal… Also that interaction of hydrogen peroxide metals is really important even for everyday life, a lot of dishwashing detergents have hydrogen peroxide in it and it even has these little metal catalysts…The interaction was important, but no one was ever able to observe it or really demonstrate it. For me I think that is one I'm very proud of because as far as I know I'm still the only one who has been able to crystalize that. I've been to conferences where people will be talking about oxygen activation, but a lot of time hydrogen peroxide comes up in that conversation and they'll present my paper. It's validating to know that my research is relevant to a lot of people and that I made a significant contribution."

If you have any current research projects, can you tell me about them?

"In some ways it's a bit inspired by my dissertation work. My students make ligands and we use what's called second sphere hydrogen bonding…[But] here I'm not looking at hydrogen peroxide, I'm looking at other small molecules that have protons that can do this hydrogen bonding and have important interactions with metals. What other molecules are there? Primarily, we focus on hydrogen sulfide (or hydrosulfide HS-). Hydrogen Sulfide is super important in petroleum refinement because there is a lot of sulfur that occurs in both liquid and gaseous petroleum feedstocks. All of the natural gas that we get, the first step was removing hydrogen sulfide and all that sulfur stuff because it's often a really big component of that when it occurs naturally. We haven't had much success with hydrogen sulfide, so we are looking at some other small molecules like hydrazine and hydroxylamine that are more nitrogen based. They still have these protons, this hydrogen bonding, and are still very important in industrial level chemistry. That's a little bit of a newer area of focus for us, but ultimately we make ligands that support second sphere hydrogen bonding. We put these on first row metals that are abundant, very inexpensive, very easy to access. Cobalt, nickel, copper, and zinc are our favorites. Lots of different ligands on those metals and then we look at interactions with small molecules, like hydrogen sulfide, hydrogen, hydroxamine, and ammonia. And I guess water, water is kind of everywhere so it happens. That we don't really look for it."

Do you have any advice to give to students searching for a research group and how to approach a professor?

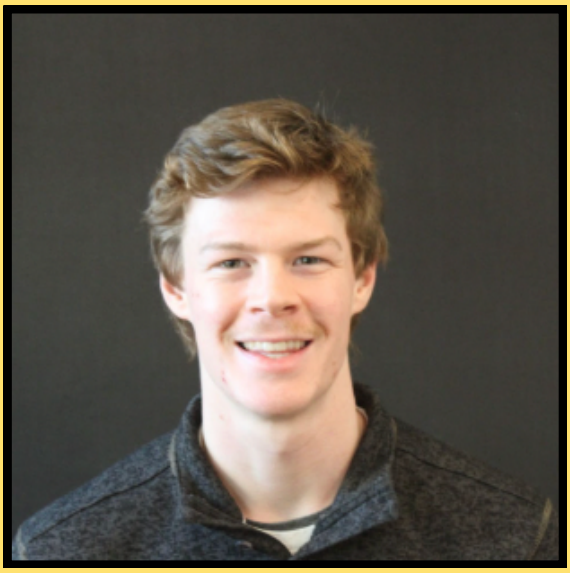
"I think for our department we have profiles on the website where we talk about research a little bit, so that's a good way to start. Look through those, see what looks interesting and then reach out through email. We get a lot of emails, so don't be discouraged if someone doesn't respond you can always drop by their office. Talk to them or you can track down their research students. Ask them what it's like? Do you enjoy it? What kind of things do you do? A lot of times what we do, like on paper or the website, doesn't portray what it looks like to be in the lab. Think about whether that sounds fun. Research can be a credit for some, a requirement, sometimes we have money to pay the students, but a lot of the time research students are just volunteering. They do research for extra training. It's really valuable because we're giving them a lot of knowledge and skills that other students don't get. Our students that leave this program with the chemistry major, they're very desirable. A lot of people told us that they like hiring our students. The reasoning is because our students have a bit more hands-on experience than a lot of the other bachelor's level students…Because we don't have this big group of graduate students as TAs, undergrads get to do a lot in our advanced labs. My students in the research lab run all their own NMRs and IRs by themselves. They use a lot of the instruments on their own because they have enough training to do so. A lot of times for teaching labs we don't do that because there's a bunch of them that takes forever and we don't want them to mess up the instrument. We give our students lots of opportunities to learn those extra things. You get a lot of skills out of that, but if you're gonna make yourself do this for hours every week when you aren't getting paid or credit, enjoy it."

Do you have any advice for students wanting to present at a conference and/or publish with a professor?

"Publishing a paper is great, but for us it usually happens on a pretty slow scale. Most of a lot of the students, if they do end up on a paper they've long since graduated. Getting a paper before you graduate is mostly about getting lucky about joining a project at just the right stage to get it published…However, going to a conference is something that absolutely can happen before graduation. I always try to take my students to a conference before they graduate and sometimes they get to go to multiple conferences depending on when they start…Presenting research at a conference typically looks like doing a poster presentation. You work with your advisor ahead of time to make a poster, it shouldn't have a lot of words on it. It should have some data, structures, or some visual aids. What I tell my students is, don't think about this as a presentation, think of it as a conversation. Don't think about this as giving a speech or something like that. This is having a conversation. One or two or three people that come up to your poster and they just want to hear, they just want to talk to you about what you do. If you enjoy your research and it's something you're excited about talking about, it shouldn't be difficult or scary."

ALUMNI SPOTLIGHT

BY SARAH TUCKER



SETH BRAHNEY

Graduation: Spring 2025
Degree: Bachelor of Science in Chemistry, Concentration in Analytical Forensics
Involvements at App: Part of Reddish and Weerasinghe Labs. Club Cross Country and Track Team.
Now Attending: University of Kentucky

What degree are you pursuing at the University of Kentucky?
I'm pursuing my Master's in Toxicology and Cancer Biology, but decided I want to get my PhD in this field. I'm currently working on the PhD application. My degree falls under the Integrated Biomedical Sciences (IBS) umbrella program.

What are you involved in on campus other than your studies?
Run Club!

What is your coursework like?
This semester I'm taking 10 credit hours. My classes are biochemistry, molecular biology, practical statistics, a professional development seminar, and a research seminar. Classes aren't that intense in terms of homework, but the time that I would normally spend doing homework, I use to study for exams. Also, there's no lab with lectures. It's just a lecture. And then whatever research lab you're in. It frees up a lot of time, which is really nice.

How has the transition to grad school been?
Our orientation was online, and I didn't get to meet any students or professors. I had to reach out to professors on my own. Nothing was handed to me, so to speak. I had to seek it out. I do miss the mountains, but it's also nice being in a big city. You're surrounded by everything you could need, which is not necessarily the case in Boone. In terms of people in my classes, it's been interesting talking to people because of the diversity. And not what we traditionally think of in terms of diversity, more so like where they went to undergrad, the degree they're getting, and where they're from originally. Everyone has interesting stories.

What parts of your undergraduate experience have been most helpful to you in grad school?
The diversity of courses that I had to take in other scientific disciplines has helped. For example, having to take molecular biology at App State has helped me succeed in my molecular biology class now, which is more in-depth. Also, I really enjoyed my time at App and the very personal connections I made with professors and classmates. Moving to a bigger institution, those interpersonal skills translate well. Others might be intimidated by bigger classes, but I feel confident creating personal connections within that setting.

Academic Advising & Course Planning

BY ABIGAL ZIMMERMAN

Get Ready Early!

Spring 2026 registration is coming up soon and classes are viewable! Take time to review the available courses. Check which classes fit your schedule before meeting with your advisor. Planning ahead will make registration easier and increase your chances of getting the classes you want.

Registration

Before your registration day, make sure you have your PIN and a list of the courses you plan to take with CRNs. Check your registration date and time on the Registrar's website under the registration section. Signing up as soon as your window opens gives you the best chance to get into the classes you need.

Degreeworks

Degreeworks is a super helpful tool for planning your courses and keeping track of your degree progress. You can check your current plan and see which classes you still need. If anything looks confusing or you have questions about your progress, your advisor can help.

Know Your Permits!

While some research courses require a permit to enroll, like CHE 2000 (Sophomore Research), CHE 3400 (Junior Research), and CHE 4400 (Senior Research), other classes that may have previously required these have been changed. Permits are no longer required for CHE 2210/2211 (Quant Lecture and Lab), the physical chemistry sequence (CHE 3301 + 3303 and 3302 + 3304), and CHE 3560 + 3561 (Instrumental Analysis). While it may seem daunting, don't worry, your advisor can help by filling out these permits for you. Permits can also cover variable situations, like taking a lecture without lab. Be sure to meet with your advisor early so you can figure out what you need!

As a Side Note:

Forensic Microscopy (CHE 4800)will not be offered this spring, but can be substituted with the following classes: CJ 3050 American Legal Systems (3), CJ 3551 Criminal Law (3), CJ 3400 Theories of Crime and Justice (3) , CJ 4548 Cold Case Review (3), research courses CHE 2000 (1) or CHE 3400 (1), CHE 2526 Chemical Safety (1), CHE 3302 Physical Chemistry II (3), CHE 4620 Environmental Chemistry (4), BIO 2400 Genetics (3), BIO 2410 Genetics Lab (1), BIO 2700 Human Genetics (3), or STT 3820 Statistical Methods I (3). **The lab portion (CHE 4530) will still be available.Please discuss with your advisor for any questions or updates to upcoming CHE class offerings!**

CHEMISTRY TRIVA! DID YOU KNOW?

Formic Acid was first isolated by distilling ants! This is also why an ant's nest can be referred to as a formicary!

The prize money won from a Nobel prize is actually sourced from Alfred Nobel's estate, which was built with and continues to thrive off of dynamite profits!

Eating a marshmallow and digesting it are the same reaction, just at different speeds!

A Carbon atom with 5 bonds exists and is referred to as a "Texas Carbon"!

Metal can crystallize! Credit to Professor Wallen!

Molecular oxygen is actually weakly paramagnetic (attracted to), and oxygenated blood is diamagnetic (repelled)!

The Human body consists of ~7×10^{27} atoms. That number looks like this: 7,000,000,000,000,000,000,000,000,000. Carbon is responsible for filling ~803,000,000,000,000,000,000,000,000 of those spots.

For reference, only about 4.35×10^{17} (436,117,076,600,000,000) seconds have passed since the big bang.

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