



Physics

Message from the Chair



As you may know, the department experienced an extraordinary loss this year, with the passing of Dave Seely in September. Dave was a cherished member of the department,

a mentor to faculty and students alike, and dedicated to helping the College live its best life (as the saying goes). He spent 28 years at Albion College, from 1992 to 2019, teaching his final course, Phys 245 (Electronics) in the fall. He was not only an excellent teacher and colleague but he was a true fan of the Britons, often traveling with his family and his friend Paul Anderson (Math and Computer Science) to cross-country and track meets and equestrian competitions, among others. On football Saturdays, he could usually be found at Sprinkle-Sprandel Stadium cheering on the football team. And, if you couldn't find him anywhere else, you could find him in his office! Dave supervised multiple research students over the years and taught many more. He also had long-lasting research collaborations with colleagues at the University of Toledo and Oak Ridge National Laboratory, to which he often brought students. Dave was devoted to the College and to his wife, Debbie, and son, Matt. The department is still grieving but celebrating his life in many ways. The Dave Seely Memorial Fund has been established, and we plan to use the funds to create an annual student award in Dave's name. Please donate at <https://bit.ly/3nNQ3VV> or to the department directly. We are also planning a virtual or in-person memorial service, as well as creating a memorial page linked to the department's website on which we'll post student, alumni, and faculty memories of Dave. Read more about

Dave's amazing career at Albion College at <https://bit.ly/36OA17e> and stay tuned for updates on the memorial service.

As a department, we are adjusting to the "new normal" of teaching during a pandemic. The College decided to condense our 14-week semester into two 7-week modules in order to make any transitions to online-only instruction as smooth as possible (and certainly smoother than what many of us experienced last March). Students take only two courses at a time, but yes, that means we teach all (or most) of the material in half of the time. It's been challenging for all of us, especially when we are simultaneously teaching part of the class online and part of the class in-person. We also have the option to teach all online or all in-person, depending on the size of the class and the preference of the instructor. Fortunately for all of us, we've been (mostly) patient with each other and flexible with expectations, though I suspect we are all looking forward to the Winter Break, as we've had none since classes started in August. The Spring 2021 semester starts in late January and will be structured in the same way, with only slight adjustments and no Spring Break.

Homecoming 2020 was virtual this year, and we jointly hosted an Open House with Math/CS. A few former faculty joined us, and I hope we saw a few of you there. If you missed it this year, though, let's all cross our fingers that HoCo 2021 is in-person, on campus, and on a beautiful day! It would be wonderful to see many of you back on campus.

Go Brits, Go Physics/DDPE, and *Io Triumphe!* Be well and stay safe.

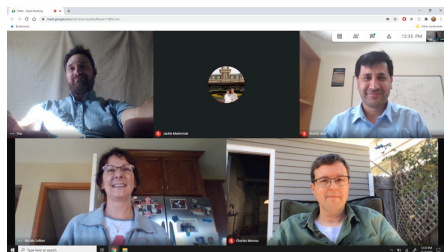
Nicolle Zellner, Chair
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Faculty News

Nicolle Zellner, PhD

This semester marks the start of my 16th year at Albion College and OMG!, what a semester it's been. As you've read, we are teaching in a pandemic, but the College has figured out a safe way to keep us mostly in-person, though the instructor can choose his/her/their preference. Once all the students were sent home back in March, I quickly became versed in the benefits (and challenges) of teaching via Google Meet. I taught both Phys 102 (*Physics of Urban and Environmental Problems*) and Phys 105 (Introductory Astronomy) entirely online. If it weren't for my TAs, Jack Hines (*Physics/Astronomy, Class of 2020*) and Micah Cross (*Accounting, Class of 2022*), I don't know how I would have managed the lab sections in Astronomy. I know I've said it to you both already, but if you're reading this, thank you again! I taught Phys 105 again this fall, and it went much more smoothly.

Since all conference and research (well, any) travel was cancelled, I spent time in the summer writing up results of our NASA-funded experimental investigations in which we evaluated the effects of simulated impacts on the chemistry of simple sugars. We applied our experimental results to actual measurements of these sugars on comets and, extrapolating impact rates back to the first billion years of solar system history, reported that a Moon's mass of glycolaldehyde (a two-carbon sugar) could have survived impact delivery to a young Earth. We thus showed that this important starting ingredient for making ribose and amino acids would have been common. You can read more about

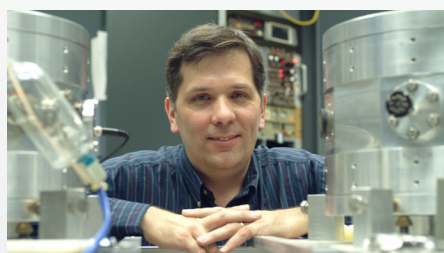


this work at <https://bit.ly/38W1yGq>, co-authored with Jayden Butler (Physics, Class of 2017) and Vanessa McCaffrey (professor in Chemistry).

I often think of the different schools I've attended or taught at and thought I might one day write a blog titled "I Chose the Purple Toothbrush" (even though my favorite color is red) to reflect my ever-growing admiration of my colleagues and the students at Albion College. These past several months more than ever have shown the compassion, flexibility, and perseverance that embodies Britons - faculty, staff, and students alike. The experience of teaching in a pandemic, while certainly stressful, has been better than I expected. I hope all of our wonderful Physics and DDPE alumni are also persevering. Please let us know how you're doing. And be well.

Dr. Charles Moreau, PhD
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2020 has been a tumultuous year for all of us. Still, there are a great many positives that I can point to for myself, the department, and the college. Unfortunately, all things good and bad are overshadowed by the tragic loss of our friend and colleague, Professor David Seely, after a long battle with cancer.



I have known David since 2001 when I began my career at Albion College. He was one of the most dedicated, caring, and committed people I have ever had to the pleasure to know. He was the person I tried my best to emulate as a faculty member, and he inspired me to try to be a better person.

He was an instructor of the highest caliber, spending limitless time preparing lectures and making himself available to students. He was a mentor of tremendous impact to countless alumni. Prior to his passing, stories poured in expressing how David was the reason an individual chose Albion College and how he started them on the path to their vocation.

David took great joy in his relationships. He was a great friend to many of our colleagues, especially Paul Anderson. He found genuine happiness in the successes of his students, both professional and personal. He was always most excited when sharing news about a former student's accomplishments. He took every opportunity to showcase the great outcomes of our alumni.



For my part, I considered David a close friend. He and I shared a strong belief in the role of the traditional liberal arts as a transformative experience; that a liberal arts education helps prepare students of a life of meaning and to make positive contributions in society. I will never be the faculty member David was, but I will honor his memory every day by finding ways to make the world around me better. All wounds heal in time, but I will always feel the loss of David's passing.

Dr. Phil Voss, PhD
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Much has changed in the Department of Physics since I arrived in the fall of 2016. First and foremost is the loss of our dear friend and colleague Dr. Seely. His wisdom, genuine kindness, and unlimited patience (especially with this young faculty member) will be sorely missed. Next, I'm into my third year of teaching our introductory physics course sequence for scientists and engineers (PHYS 167 and 168) in the Studio Physics format. As opposed to the previous (and more traditional) lecture and lab approach, in our Studio Physics space you'd be just as likely to see students on the floor with laptops and Bluetooth

kinematics carts as in their chairs taking notes, socially-distant groups conducting an experiment on wave motion as working quietly through example problems, and smartphones wielded to answer conceptual questions as me deriving potential energies from conservative forces. And this approach is working- data collected so far unambiguously attests to increased student learning! Lastly, I'm more technologically savvy in my pedagogical approach in response to teaching constraints due to the COVID-19 pandemic.

But not everything has changed. We are still a small department that cares for our students and their success while they are with us and after they leave. We still work alongside our majors on research projects big and small and facilitate internship connections with potential employers. And we still love to teach. Even if that means doing so online.

The spring and fall 2020 semesters have been unlike any other. When the College announced its transition to online learning in March, I was lucky enough to have a great group of students in PHYS 168 and Thermodynamics and Statistical Mechanics (PHYS 384). I had previously adopted Microsoft One Note for "board-based writing" and digital assignment management. This facilitated a nearly seamless transition to remote learning for my students. We used Google Meet; students could communicate with one another and I could share my tablet screen while working on problems and discussing lecture slides. Everyone cooperated and put forth effort, making the best out of an unfamiliar and challenging situation. I'd especially like to thank our IT department for doing a phenomenal job of highlighting useful software resources and offering countless hours of helpful training.

Compared to last spring, this semester feels close to normal. I am once again able to teaching students (masked) face to (masked) face. Like many colleagues across campus,



I have adopted the hybrid approach, mixing in-class days and synchronous remote-learning opportunities throughout the week. We are still careful to minimize contact- student hours are held virtually and all assignments are either completed on a touch-screen device or are scanned to PDF prior to submission. I have been impressed with our students' resiliency, their positive attitudes, and their willingness to adopt classroom technologies all while taking in class content at double the pace. It's not easy to be a student right now, but they've risen to the challenge!

As of March 2020, I was working alongside students on projects benefiting my research space in the basement of Kresge Hall. In our second year together, my Student Research Partner and I were putting the finishing touches on building a large plastic scintillator detector meant to sit atop the low-background shielded gamma-ray spectrometer. This detector was built from new and eBay-sourced equipment and is designed to detect cosmic rays before they interact with the spectrometer. Using sophisticated electronics, we can instruct the data acquisition system to ignore any event in the spectrometer that is simultaneous with the detection of a cosmic ray in the scintillator. (If you don't do this, cosmic rays become a source of pesky background events, spoiling the sensitivity of the gamma-ray spectrometer.) In addition, two DDPE students were designing small parts I needed and nearly began 3D-printing some prototypes as we had to leave campus. Lastly, a Senior Honors Thesis project was focused on adopting a comprehensive Monte-Carlo simulation package designed to replicate experimental data I have taken at TRIUMF, Canada's national laboratory for particle and nuclear physics. All experimental features- particle beam properties, reaction kinematics, and detection processes- must be accurately simulated and compared to experimental data to extract results like picosecond-ordered lifetimes of excited nuclear states. We are early in the benchmarking phase.

I am looking forward to the spring 2021 semester. I'll get to teach our Advanced Laboratory (PHYS 350) again. In the summer of 2019, I spent a week at UW River Falls learning all there was to know about building an open-cavity HeNe laser and using it to study laser-beam properties. As I am not a trained laser expert, I had fun taking on the role of a student again.

This experience allowed me to apply for a grant this fall to bring the equipment to the Physics Department. I am hopeful we will soon be able to add another great experiment to the PHYS 350 lineup. I'll also be teaching Quantum Mechanics (PHYS 387) again, one of my favorite classes to teach.

Dr. Shahid Iqbal, PhD
Visiting Assistant Professor of Physics



I graduated in December 2019. For spring and summer of 2020, I was working on my research paper as well as searching for the job of my interest. I stayed with my family

indoors all the time except the time when I needed to buy groceries. I was working part-time for a company as a research scientist in New York and the work was entirely online due to COVID situation, so I did not need to go anywhere, but stayed with my family the whole time. During this difficult time, the best thing that happened to me is the birth of my first baby boy, Rayaah Shahid. This gave me a brighter side to look at during this challenging time.

My class "General Physics" PHY-115 is going very well this fall. Half of the class is online and of course, there were some technological-based problems especially in the start of the semester. However, with the passage of time I was able to minimize those problems and now everything is going fine. Module system is stressful, but at the same time it is a great experience. It is a quickest way to deal with lots of things in a short period of time and this experience gives me a lot of confidence and energy. I believe every tough experience and challenge makes you very strong.

To talk about my research, just recently (in September 2020), one of my research articles having title "Photoluminescence enhancement of perovskites nanocomposites using ion implanted silver nanoparticles" got published in chemical physics letter journal. I worked really hard on that and I am very excited to see that my work is now published. I am currently working on another topic and am planning to publish this in December 2020.

Alumni News

Kevin Chalut, '99, Congratulations to Kevin Chalut, Class of 1999, who received a 2020 Albion College Distinguished Alumni Award! Kevin graduated with majors in Physics and Mathematics, and his nomination was shepherded through the process by Dave Seely. Kevin is currently a British Royal Society Research Fellow in Physics at the Cambridge University Stem Cell Institute in England, where he leads an interdisciplinary team of researchers who are making important new discoveries about the nature and development of stem cells.

If Kevin had been allowed to travel here last April for his talk, Dave would have introduced him. Thank goodness for the Internet! You can listen to Dave's intro here at <https://bit.ly/2UL0gWh>, watch Kevin give a brief summary of his work at <https://bit.ly/2HcRBJa>, and watch a Q&A with Kevin at <https://bit.ly/2KIUade>. We'll be adding these links to our department website soon.

Previous recipients of the Distinguished Alumni Award include Norma Taber (1978), who received it in 2013. For several years, Norma has been supporting women at Albion College who are interested in careers in engineering with the Norma Taber Award. Josh Cassada (1995) received the award in 2012. He is currently preparing for his first space mission as a NASA astronaut. He has been assigned to co-crew Boeing's first mission with its CST-100 Starliner spacecraft and will dock at the International Space Station in the near future.

Julie (Schneider) Johnson, '87, After graduating from Albion, I went to MIT where I earned an M.S. in Materials Science & Engineering and an MBA. Over my career, I have worked at Motorola, Google, Lenovo, and Verifone. I currently work at Zebra Technologies as Vice President of Product Management. I also am on the Board of Directors for both Lumentum Holdings and Superconductor Technologies. I was selected for Crain's 2020 Notable Women in STEM. I live in the Chicago suburbs, have been married for 30 years, and have 3 children

Shane Walton, '07, earned his PhD in biophysics from Ohio State in 2016. His dissertation research involved designing mutations in cardiac proteins to combat arrhythmias. He now works as a senior medical writer for a medical communications agency in the Philadelphia area.



Jon Lighthall, '04, I was sorry to hear about Dr. Seely. I always enjoyed his classes and labs. I wanted to share a particularly fond memory I have of him. At the end of my first semester, Freshman year, I was doing a rocket flight demonstration for one of my classes (see attached). As we got close to the launch, I noticed Dr. Seely counting his strides from the launchpad. Then during the flight, I could see him carefully estimating the maximum angle to the rocket's apogee. After a moment's consideration, he announced how high the rocket flew. It was a simple calculation, but it made an impression on me. We learn all these tools for interpreting the physical world but we get into the habit of only applying them in the classroom or laboratory. It was inspiring to see Dr. Seely remind us that these tools and techniques are applicable everyday, all around us.

I am a Research Physicist in the Acoustics Simulation, Measurements, and Tactics Branch of the U.S. Naval Research Laboratory at Stennis Space Center in Mississippi. My family and I live on the Northshore in Metro New Orleans.

Jayden Butler, '17, I have been attending California State University - Los Angeles, or Cal State LA since Fall 2017. I am currently done with classes. I'm just finishing up with the master's thesis in physics, hopefully by this spring.

I have spent a year in JPL (Jet Propulsion Laboratory - NASA) working on research for my current thesis. My current research is about studying a Class 0 protostar IRAS 16293-2422 by looking at the spectral lines. I am currently identifying spectral lines from the star and determining the location of them.

I also have been a treasurer of Physics and Astronomy Club or PAC for the past three years as well. I was a part of DIRECT-STEM program, a research

grant program targeting minorities for two years. It was also this program that helped me get into JPL.

Fred Porter, '74, It has been 47 years since leaving Albion. I had planned to be in the 3 - 2 engineering program with the University of Michigan, so I found myself leaving Albion after my Junior year starting an electrical engineering curriculum in Ann Arbor. By December of 1975, I had been awarded a Bachelor's degree from Albion double majoring in Mathematics and Physics, a Bachelor's degree from U of M in Electrical Engineering, and a Master's degree from U of M in Electrical Engineering.

While having had several jobs while going to school, my first job after graduation was with Hewlett-Packard in Loveland, Colorado as a member of the technical staff designing desktop computers. One that I was involved with in particular was the HP9845 on which I was a named inventor on a patent for the light pen option that was available. While in Colorado, I passed the tests and was registered as a licensed Professional Engineer.

After spending eight years in Colorado, my wife (Karen Collins [75]) and I decided to move back to Michigan to allow our kids to grow up close to their grandparents and cousins. I took a job at Ford Motor Company in the Electronics Division working on a variety of systems from electronic instrument clusters, suspension controls, steering controls, brake controls, speed control, electronic stability control, and tire pressure sensing. Over the years, I was named on eight more patents, supported litigation efforts in a variety of fire cases, and presented to the National Highway Traffic Safety Administration regarding the impact of proposed safety standards.

Since 2007, I have been a consulting engineer providing technical assistance to clients requiring guidance and understanding about electrical systems' and components' function and failure modes.

My Albion experience helped me understand foundational physics of many of the components that I worked on ranging from optics to the Coriolis affect to electricity and magnetism. But even more, exposure to the other studies involved with a liberal arts education helped me become a critical thinker who was able to analyze as well as develop insight and continue a life of exploration and curiosity.

Student Awards & Scholarships

Pettersen:

Evan Ziegelman & Foster Kusz (18-19)
Sai Chintalapati & Dan McGarry (19-20)

Rood:

Keiten Davis (18-19)
Austin Armstrong (19-20)
Austin Armstrong (20-21)

Tabor:

Murun Jargal (18-19)

Ricker:

Charlotte Woodrow & Ray Cook (18-19)
Jade Newkirk (19-20)

Alumni/Faculty Physics:

Foster Kusz (18-19)
Charlotte Woodrow (19-20)

The Physics Department welcomes donations to its general fund, to support student and faculty research and travel. Please consider donating to the department directly at this link <https://bit.ly/36Qw5Td>.

Best wishes for the holidays!



THANK YOU
TO ALL WHO DONATED!

CONTACT US

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