One of the things I remember best about my faculty orientation in August 2000 was an enthusiastic presenter talking about the unique opportunity Wake faculty had of leading programs in Wake houses abroad. While I should have been inquiring more about retirement plans and where to park, I chased the woman down and asked where to sign up. She was very nice but, finding out I was a chemist, admitted that science classes were not commonly taught abroad. I got busy over the next few years and lost sight of the idea of teaching abroad. I had a lab to set up, courses to develop and bureaucracy to learn.

While I was busy, Global Programs and Studies (GPS) and my senior colleagues worked to improve the limited opportunities science students had to go abroad. In Summer 2008, Prof. Christa Colyer taught Chm 108, Everyday Chemistry, a liberal arts chemistry course, at Worrell House in London. In Summer 2010, Prof. Rebecca Alexander taught Chm 370, Biochemistry, at locations in Cambridge, London and Paris. She repeated the course again in 2013.

Letter from the Chair
Dear Alumni and Friends,

Since the last Deacon Chemist, much has happened from new degree programs, new spaces for teaching and research, study-abroad programs, new faculty and goodbyes and of course our reaction to the COVID-19 pandemic. Let’s start with new spaces. In 2017, the chemistry department became one of the inaugural tenants of Wake Downtown, a new WFU campus located in the Innovation Quarter of Winston-Salem that houses the new Engineering department and part of the biology department. This space is directly adjacent to Biotech Place, where many chemistry faculty have collaborations. Mark Welker, who was the chair at that time, secured the administration’s commitment to renovate Salem Hall, which was completed in 2018. Within this newsletter, Mark details the planning, moving and the highlights of these two beautiful new teaching/research spaces.

With the opening of Wake Downtown, new academic programs were initiated. Chemistry partnered with biology to offer a degree in Biochemistry and Molecular Biology (BMB), a research focused program for students at the chemistry and biology interface. Chemistry also introduced a new ACS-certified BS in Chemistry with a concentration in Medicinal Chemistry and Drug Discovery. The BMB major and the ACS-certified Chemistry BS with a conc. in Medicinal Chemistry started in 2017 and 2018 respectively and have quickly grown in...
By this time, GPS was actively recruiting science faculty to teach courses abroad. A chance meeting at a Christmas party with the Director of Global Programs and Studies landed me Worrell House for the Summer of 2014, where I taught Chm 223, Organic Chemistry II. As excited as I was in 2000 to think of teaching abroad, the reality of taking 19 and 20 year olds to London for six weeks was daunting. It was a busy, crazy six weeks but the students learned chemistry and I was relieved to return all 15 to the United States. Three of those students went on to be chemistry majors and nine completed minors.

In support of these programs, new faculty were hired, Dr. Troy Stich, teaches biophysical chemistry in the BMB program and Dr. John Lukesh teaches in the medicinal chemistry concentration, where he has developed one of the few undergraduate labs in medicinal chemistry in the nation. Dr. Elham Ghadiri, a laser spectroscopist and materials scientist replaced Dr. Mike Gross, who joined the WFU Engineering Department (replacing Dr. Ron Noflle after his retirement in 2014) and Dr. Wendu Ding, a computational/physical chemist replaces Dr. Dilip Kondepudi following his retirement in 2019. You can read more about the new additions to the chemistry faculty and remember the good times with Drs. Noflle and Kondpedui in specific articles.

The chemistry department always recognized the difficulty CHM majors had with doing a semester abroad. To remedy this, we have started a rotating summer program offering second semester general chemistry, second semester organic chemistry and first semester biochemistry at either Queen Mary University in London or Dundee University in Scotland. These offerings are planned to continue and we’re looking at ways to expand them to semester programs for students.

I became Chair in July 2019 and my to-do list centered on how best to lead the department in two new but separate buildings as a cohesive unit for teaching, research and service. Much of that first semester was learning what faculty and students needed, liked or didn’t like. In February of 2020, the first discussions of COVID-19 made their way to campus and Wake Forest closed and moved all courses on-line to finish the spring of 2020. Certainly, a lot of plans were changed or paused but the department demonstrated its true spirit by working hard and cohesively under these trying times. Faculty quickly switched to on-line versions of their classes to finish out the spring semester, we had four students complete and defend Honors theses (virtually) and held a well-attended graduation reception and awards ceremony by Zoom. I express my deepest gratitude to so many faculty and staff for stepping up to get things done during this time.

Campus remained closed this summer but we offered an expanded roster of on-line summer school courses. Research labs re-opened on June 10 for graduate students and post-doctoral fellows and undergraduate researchers will be welcomed back in the fall. These summer school courses have been valuable training, especially for the lab portions, in preparing us for this upcoming fall when we plan to offer all of our courses (no classes were canceled). These courses will be presented in various modalities including face to face, blended and completely on-line. Thirty-two of our thirty-four lab sections this fall will have some in-person component of learning with students in the labs under proper health and safety guidelines. To prepare for this change in course delivery, all chemistry faculty spent a portion of their summer in on-line education training. Again, faculty and staff have worked hard and gone way beyond their normal duties to prepare to make the Fall 2020 semester the best it can be.
Moving forward, we plan to incorporate the experiences from last spring and this summer into our teaching, research and service activities. Already, faculty are providing positive feedback on methods they are trying in their virtual classrooms that they would not have tried in the past. We are doing the same with our research and scholarship to provide faculty and students with the best research-based opportunities and learning experiences. Along with COVID-19, this year also brought numerous social issues to the forefront and we will prioritize improving the diversity and inclusivity of the department from undergraduate and graduate students to faculty and seek ways to support these students/faculty.

I hope this letter gives an overview of recent activities in the chemistry department and I encourage you to read specific stories that will provide more detail. I hope that we will see you on campus sometime soon.

Sincerely,
Bruce King
Kitchin Chair and Professor of Chemistry

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History of Wake Downtown and Salem Renovation
By Mark E. Welker

In 2005, Chemistry had 720 students per year taking 100-200 level lab classes, 14 majors and the Department had been requesting additional space since the 1980s. By 2014 those numbers had soared to 1200 students/year in 100-200 level classes and 38 majors. This big increase in students also put a big strain on our operating budget so when I started as chair 7/1/2014, I knew we needed to work hard on space and budget for chemistry.

I started talking informally to Provost Rogan Kersh about possible interdisciplinary degree programs we might have that summer, but at that point in time I thought these might be housed in a new interdisciplinary science building or a new wing on Salem Hall on the Reynolda campus. Over that summer, it became clear that the medical school was going to move into a to be renovated Reynolds Tobacco building, Building 60, in downtown Winston Salem. As I continued to talk to the Provost, it also became clear that there was going to be an opportunity for space in Building 60 for Reynolda campus degree programs as well. The first rendering of that space that I saw was dated 10/23/14. Over that fall, conversations continued and in January of 2015, I presented the possibility of moving into space in Building 60 to the Provost, it also became clear that there was going to be an opportunity for space in Building 60 for Reynolda campus degree programs as well. 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began teaching chemistry abroad during the Fall and Spring semesters. I taught Chm 223 and Chm 351 (History of Chemistry) through Wake’s Southern Cone program, which spends time in Buenos Aires and Santiago, in Spring 2017. In Spring 2019, Prof. Abdou Lachgar taught Chm 111 and a first-year seminar as part of the Global Awakenings program in Copenhagen. In Spring 2022, Prof. Colyer will teach Chm 280 and Chm 351 (Special Topics) at Worrell House in London.

2019 CHM 370, Loch Ness, Scotland.

Our students will work in a global marketplace and benefit as much from study abroad as students in the arts and humanities. Because chemistry majors have a more rigid curriculum, carving out the time to travel can be difficult. By making sure they have opportunities to take chemistry abroad, we have made it much easier for our students to fit an abroad experience into their schedule. In the last ten years, over 125 Wake Forest students have taken chemistry outside the United States and the department is committed to continuing to regularly offer chemistry courses abroad and increasing the financial aid to students for summer courses.

help you if your collaborators are on Reynolda campus. At the time also, the logistics of getting students back and forth seemed daunting. However, by early 2015, it was apparent that there was significant interest within Chemistry in space downtown, and I communicated that to the Provost. A decision to pursue this space was made in spring 2015 and a call was issued for new degree programs which might be housed downtown. In September 2015, Chemistry submitted two proposals to the Committee for Academic Planning for that call, one for a BS in Chemistry with a concentration in Medicinal Chemistry, and one for a BS in Biochemistry and Molecular Biology to be jointly administered with Biology. Later that fall these two degrees, along with a BS in Engineering were selected for funding and early 2016 was consumed by both academic and space planning for these degree programs. Rebecca Alexander was named as the founding Director of Academic Programs for Wake Downtown and by summer of

2016 renovation of Building 60 was well underway. An aggressive timeline had faculty involved moving into Building 60 for the start of the spring 2017 semester and we moved into Wake Downtown (WD) in January of 2017. Currently eight chemistry faculty have offices and research labs on the second and third floors of WD, we have instructional labs on the first and fourth floors, and a departmental instrumentation facility in the basement.

During 2016, it also became clear that the new WD space would provide a unique opportunity to renovate Salem Hall, since the Engineering space would be largely completed by early 2017 but not occupied. That empty space could be used by Chemistry during the 2017-2018 academic year to help continue our research and teaching while Salem was renovated. The fall of 2016 and spring of 2017 became planning time for the renovation of Salem Hall and in May of 2017, Salem was evacuated. Fifteen months of renovation and construction followed, and a renovated Salem Hall was opened to students for the first time in August of 2018. The new Salem, like our WD space, has larger, more open classrooms and
Meet the New Faculty

In recent years four new tenure track faculty members have joined the department. It’s our pleasure to introduce them!

Elham Ghadiri earned her Ph.D. from the Sharif University of Technology in 2010 and was a post-doctoral researcher at Duke University before joining our department in 2018. Her research includes nanomaterials fabrication and characterization, including nanodevices for energy conversion, optoelectronics and bioelectronics; nano biomaterials (bio pigments); time-resolved (femtosecond-millisecond) laser spectroscopy/microscopy technique development; lab rooms that make collaborative learning much easier. Chemistry owes a big note of thanks to our administration for believing in us and investing in our department. A big thank you should also go out to our faculty and staff who worked through a lot of disruption from 2016-2018 and kept our degree programs going while planning for better student facilities for many years to come.

Please stop by and take a tour of both spaces next time you are campus. We now have better classrooms and labs for teaching undergraduates, and more modern facilities for research labs. In addition, there’s much more open space where students can study and collaborate outside of class meetings.

The Lukesh Group shares their loves of chemistry with the community during SciTech.

Retirements

Since Ronald (Ron) Noftle came to Wake Forest with an expertise in inorganic chemistry, more than 66 different undergraduate students have had the opportunity to work with him on mentored projects. Sixteen of his many manuscripts have been published with undergraduate co-authors. This track record is why the department named its most recently established award for graduating chemistry majors the Ron E. Noftle Honors Thesis Award. Decades of working with undergraduates in his chemistry research also earned chemistry professor Ron Noftle national recognition as he was one of 12 educators selected as Senior Scientist Mentors by The Camille and Henry Dreyfus Foundation in 2010. He was also the recipient of one of the inaugural URECA Faculty Awards for Excellence in Mentorship in Research and Creative Work in the Sciences in 2013. “Ron has set the bar for faculty-student engagement and mentorship, and he typifies the spirit of the ‘teacher-scholar’ ideal, especially through his one-on-one interactions with undergraduate (and graduate) students in the research laboratory,” said Christa Colyer.
use of ultrafast spectroscopy/microscopy techniques to study photochemical/photophysical processes in systems including nanomaterials, organic/inorganic dye molecules, and semiconductors. Elham has finished her second year at Wake Forest University and will be teaching College Chemistry in the fall.

John Lukesh received his Ph.D. in 2014 from the University of Wisconsin–Madison and was a postdoctoral researcher in Dale L. Boger’s lab at the Scripps Research Institute from 2014–2017. He has completed his third year in our department and plays a key role in the medicinal chemistry lecture and lab classes now offered. The Lukesh lab uses synthetic organic chemistry in an effort to generate novel redox-active molecules with

After a tenure of 47 years, Ron retired from Wake Forest University in 2014, but has still actively mentored students in his laboratory as an emeritus research professor and no one is surprised.

The department established the Ronald E. Noftle Honors Thesis Award to acknowledge the impact Noftle has on undergraduate research at Wake Forest. The 2020 recipient was Noah Watkins. His thesis was on the pivotal role SLC transport protein plays in the efficacy of a potent DNA-targeted hybrid anticancer agent. His research mentor was Uli Bierbach.

After 32 years of serving Wake Forest University, Dilip Kondepudi retired in June 2019. A physical chemist noted for the 2008 textbook Introduction to Modern Thermodynamics, which is a follow-up to the 1998 Modern Thermodynamics co-written with Belgian chemist Ilya Prigogine, Dilip was central to the education of most chemistry majors for a period spanning over three decades. His research involved formulation of a general theory of spontaneous chiral symmetry breaking in chemical systems, the fundamentals of which depend only on the two-fold mirror-image symmetry and not on the details of the chemical kinetics. Close to equilibrium, the system will be in a symmetric state in which the amounts of the two enantiomers of all chiral molecules are equal. When the system is driven away from equilibrium by a flow of chemicals, a point is reached at which the system becomes unstable to small fluctuation in the difference in the amount of the two enantiomers. As a consequence, a small random fluctuation in the difference in the amount of the two enantiomers spontaneously grows and the system makes a transition to an asymmetric state. The general theory describes this phenomenon in the vicinity of the transition point. In retirement, Dilip is splitting his time between Florida and NYC.

Recent Student Awards

The Blackbyrd Scholarship was established by Betty Black Byrd for a rising senior who is pursuing a major in chemistry based upon academic performance. Noah Watkins was supported 2019-2020 and Adwoa Twenoboak is the 2020-2021 recipient.

The Department of Chemistry is pleased to announce recipients of the Harton Scholarship for Chemical Industry, recently established through a generous donation from Jim Harton (WFU/74) and his wife, Courtenay Harton. The scholarship is valued at $5000 and awarded each spring to a newly declared chemistry major intent on exploring career opportunities in the American chemical industry with a possible renewal for the senior year. The goal of this scholarship is to contribute to the future success of the American chemical industry by providing financial support to chemistry majors who demonstrate the potential and motivation to develop into future leaders in the chemical industry. Gabe Sowards (BS 2020) held the scholarship for both his junior and senior year. Current senior Adwoa Twenoboak was the 2019 recipient, and she
interesting biological properties. With a broad interest in molecular design and its applications to biology and medicine, they are actively pursuing the following areas of research: construction of novel selenium-containing scaffolds with useful redox properties and therapeutic applications; elucidating the roles of hydrogen sulfide—an important signaling molecule expressed in mammalian systems—through molecular design and the development of novel reaction-based probes and donor scaffolds; and new methods involving electrophilic selenium catalysis for accessing privileged heterocyclic scaffolds via key C–C bond forming reactions. The research group is also actively engaged in scientific outreach in Winston-Salem.

Before coming to Wake Forest, Troy Stich earned a Ph.D. in Physical Chemistry

has been joined by the 2020 recipient, junior Ikeer Mancera-Ortiz. We look forward to hearing of their future success in the chemical industry!

Each year, the department recognizes the success of graduates through several endowed awards:

The **John W. Nowell Award in Undergraduate Chemistry** is given in memory of the late beloved chemistry Professor, Jack Nowell, and is presented each year to a graduating student who has excelled in all aspects of our chemistry program (ranging from outstanding performance in the classroom to independent research in the laboratory). 2020 recipient **Noah Watkins** is entering the Chemistry PhD program at Duke University.

The **Grant Backerman American Institute of Chemists Foundation Undergraduate Student Award** is sponsored by the AIC as well as the Family of Grant Madison Backerman. Grant was an exceptional chemistry student, and scheduled to receive this AIC award in 2015 but passed away unexpectedly. The award is presented to recognize an outstanding chemistry student on the basis of demonstrated overall ability, leadership, scholastic achievement and who plans to pursue further chemical studies. The 2020 recipient was **Nolan Green**, who will attend the University of Illinois at Urbana-Champaign to pursue a PhD in organic chemistry.

Each year the department makes a number of travel, research and academic awards to students and we use alumni and friends gifts to provide them. Please consider a gift to the department to help us continue this student recognition.

**Alumni News**

**Shiba P Adhikari** (Ph.D. 2017) is a postdoctoral research associate in the Materials Science and Technology Division (MSTD) at Oak Ridge National Lab. His research focuses on zeolite based heterogeneous catalysts synthesis, characterizations, and testing with major application in biomass conversion. [https://www.ornl.gov/staff-profile/shiba-p-adhikari](https://www.ornl.gov/staff-profile/shiba-p-adhikari).

**Erika Bechtold** (PhD 2010) is Director of Technology Commercialization at the Harvard University Office of Technology Development; Wyss Institute for Biologically Inspired Engineering.

**Zach Brown** (BS 2018) is enrolled in the School of Pharmacy at the University of North Carolina.

**Ranjan Banerjee** (PhD 2010) is Associate Director of Chemical Development at Constellation Pharma, a blood cancer drug company.

**Jenna DuMond** (PhD 2012) is Lead Chemist at the FDA’s Center for Tobacco Products, Office of Science.

**J. Michael Ellis** (BS 2002), is the executive director of small molecule discovery in immunology and neuroscience medicinal chemistry at Bristol Myers Squibb in Cambridge, Massachusetts.
from the University of Wisconsin-Madison in 2005 and conducted post-doctoral work at University of California-Davis, 2005-2018. The Stich lab uses a combination of biochemical and spectroscopic tools to study enzymes involved in catalysis of free radical reactions in nature control the chemistry and prevent deleterious side-effects. They focus efforts on interrogating the radical SAM family of enzymes, which employ an iron-sulfur cluster and S-adenosylmethionine (SAM) to generate substrate radicals that the protein matrix then guides toward product formation. In investigating these processes, Stich group researchers employ protein expression and anaerobic purification, manipulate the chemistry via biochemical and genetic means; and use a variety of spectroscopic techniques including electron paramagnetic resonance to achieve success. In his first two years, Troy developed a course on biophysical chemistry taken by chemistry and BMB majors.

Wendu Ding received a Ph.D. in Theoretical Chemistry from Yale University in 2015 and conducted post-doctoral research at Northwestern University and MIT. He

Julie Haines (PhD 2011) is Research Assistant Professor and Metabolomics Core manager at the University of Colorado Anschutz Medical Campus.

Summer Hanna (PhD 2011) is working in the UK for British American Tobacco. She’s featured in an interesting video celebrating women in science.
(https://www.bat.com/group/sites/UK__9D9KCY.nsf/vwPagesWebLive/DOBLNMYH)

Katie Hedden (BS 2018) has completed a job at Stryker in NYC and will be going to medical school at St. George’s University in the fall of 2020.

Zachary D. Hood (B.S. 2013) helped non-profit organizations build schools and children's homes in Central America and served as an intern at Oak Ridge National Laboratory before receiving his Ph.D. in 2018 from the Georgia Institute of Technology, where he received the Materials Research Society Graduate Student Award (Gold). After postdoctoral work at the Massachusetts Institute of Technology, Zach was awarded the Maria Goeppert Mayer Fellowship at Argonne National Laboratory, where he now works on materials for energy storage and conversion, focusing on the development of solid-state ion conductors for lithium and sodium metal batteries.
(https://www.anl.gov/profile/zachary-david-hood)

Seth Jones (BS 2019) is beginning his second year at Southern College of Optometry in Memphis TN.

Willis Jones (BS 2014) is now a Postdoctoral Research Scientist at Savannah River National Laboratory in Aiken SC. His research involves Laser Induced Breakdown Spectroscopy (LIBS).

Lauren Rajakovich (BS 2011) obtained her PhD from Pennsylvania State University in 2017, and was selected as a Merck fellow of the Helen Hay Whitney Foundation to support postdoctoral research on enzymes and metabolic functions of the gut microbiota that are associated with human disease with Emily Balskus in the Department of Chemistry and Chemical Biology at Harvard University.

P. Keegan Rose (BS 2020) has enrolled in medical school at West Virginia University.

Daniel Santana, Noah H. Watkins and Yunxin Yao (all BS 2020) join Taylor Outlaw (BS 2019) in pursuing PhD degrees in chemistry at Duke University.

Ron Williams (Ph.D. 1990) recently retired from the position of Director of Crop Protection Technology Safety in the Global Scientific and Regulatory Affairs group at The Coca-Cola Company, where he was responsible for regulatory compliance and agricultural ingredient sourcing strategy across The Coca-Cola system. An analytical chemist by training, Ron had more than 22 years of experience in the crop protection industry in various laboratory-based and regulatory roles prior to joining The Coca-Cola Company.
joined Wake Forest as a faculty member in 2020 and will be building his group this coming Fall. The Ding group will focus on research topics including plasmonic materials such as noble metal nanoparticles, complex structure materials such as supramolecular assembles and MOFs, molecular ensembles such as SAMs and polymers, chemical mixtures such as electrolytes, etc. Theoretical tools will be utilized to investigate the properties of these materials and systems, as well as the interactions between these systems and single molecules and particles. New theory and methods will be developed to gain new physical insights into related chemical and physical processes, including light-matter interactions, electron and energy transfer and catalytic reactions. This fall, Wendu will be teaching Physical Chemistry I lab.

**Mu Yang (PhD 2017)** is conducting postdoctoral research at the University of Minnesota Department of Medicinal Chemistry.

**Yuyang Zhu (PhD 2015)** and wife **Lin Zhang (MS 2014)** live in Atlanta, where Yuyang is a post-doctoral researcher at Emory University. They have an eight month old son, Coen.

The Ding research group will make and study plasmonic materials.

**Friends of Chemistry Updates**

By Al Rives

The Friends of Chemistry have continued and even expanded their activities this past year. We have come upon a winning formula for the Career Event over the last four Homecomings: groups of students have group discussions with groups of alumni, then cycle through four alumni groups representing career paths from industry to academia. Most of the alumni participants were present on campus, and several were able to participate virtually. Here, **Kent Langston, Alec Christian, and Alissa Guarnaccia** (all BS 2014) talk with students about their grad school experiences at Harvard, UC Berkeley, and Vanderbilt respectively.
FoC also recognized a need for a career event in the winter when students are concerned about applying for jobs and internships. The structure was similar as in the fall, but each group of alumni had a range of career paths and talked with students about specific aspects of different career paths. The alumni participants had an extra incentive to participate – they were invited to join the faculty in a suite at a men’s basketball game (GT 86 – Wake 79, but we got to see Dave Odom and the ’95 ACC Champs honored). Here Gene Gillman (PhD 2000) and Jeff Hogg (BS 1979) are in a room with students, while Rick Strittmatter (BS 1985), Lauren Rajakovich (BS 2011) and Nitya Anand (BS 2010) participated virtually. Alumni who would be interested in talking to our students in person or virtually should contact Al Rives (rives@wfu.edu) and let him know of their interest.

The alumni awards presented by the FoC were another big part of the year. At homecoming Kasha Patel (BS 2012) was named the 2019 recipient of the Young Alumni Award. We also happily hosted the 2018 award recipients in their campus visits – Erika Bechtold (PhD 2010) as the Young Alumni Award recipient, and Steve Stroupe (BS 1966) as the Distinguished Alumni Award recipient. A brief description of each of the alumni award recipients can be found on the department website, https://chemistry.wfu.edu/alumni/alumni-awards/

Here, Steve Stroupe receives his award from 2018 FoC Chair Bill Batten (BS 1974) at his seminar in October.

The department is grateful to the alumni leadership of the FoC which includes Chair Elaine Dunavant (BS 2014), Chris Junker (PhD 2011), Ginger Milne (1997), Carrie Henderson (BS 1998), Keith Merritt (BA 1998), and Jim Harton (BS 1974).

Every aspect of the world today - even politics and international relations - is affected by chemistry.

Linus Pauling, 1901-1994