The Forensic Science Department at VCU has a long history of student participation in professional conferences and meetings. It is not unusual for more than 20 students to attend or present at the American Academy of Forensic Science (AAFS) Annual Scientific Meeting. Additionally, we have been well represented at subject specific conferences and annual meetings. As our departmental research program grows so has our participation in the professional forensic science community. This year has been an exceptionally active year for the department in our attendance and presentations outside of the university. Twenty-eight graduate and undergraduate students and faculty presented workshops, talks and posters during the five days of the AAFS conference in Las Vegas. A dozen additional students attended the conference to listen, learn and network. We also had over 45 students and faculty present and/or attend professional meetings or conferences of the International Symposium on Human Identification, the American Society for Microbiology Biodefense and Emerging Diseases and the Society of Forensic Toxicologists (SOFT), our regional Mid-Atlantic Association of Forensic Scientists (MAAFS) annual meeting and Gordon Research Conference: Forensic Analysis of Human DNA. Closer to home, fifteen undergraduate and graduate students presented posters at the VCU Annual Graduate Student Research Symposium and Exhibit and the Annual Poster Symposium for Undergraduate Research and Creativity.

As a result of the research, faculty and students published over 25 articles in journals and books. You can find VCU forensic science research in publications such as The Journal of Forensic Science, the Journal of Analytical Toxicology, the Journal of Forensic and Legal & Investigative Sciences and the Journal of Microscopy.

Check out our department research for the 2015-2016 academic year!
Department of Forensic Science Diploma Ceremony May, 2016

Undergraduate Students

Ali Al Mazrooei  
Danny Amaya-Ruiz  
Nicole Anthony  
Nicole Allison Auka  
Arnesha Kiana Avery  
Ardalan Mason Azimi  
Dair Jose Azuaje  
Gladys Balcarcel  
Cailin Michelle Becker  
Ivy Petrie Blue IV  
Festus F Boateng  
Samantha Bosworth  
Tiffanie Nicole Branch  
Angela Lynn Brand  
Katelyn Nicole Lee Brooks  
Shelle N. Burke  
Jenny Waiyu Cheung  
Jessica E. Cofflin  
Kathryn Alexandra Cooks  
Karen L. Cruz  
Kam-Mira Joy Edwards-Curley  
Anne C. Eastman  
Amy Eavey  
Reema Hussam Elshaer  
Malak Fathi  
Christen Victoria Green  
Raquel Green  
Shaunice K. Grier  
Judith Gutierrez  
Diamond LaJuan Harrison  
Linda Ho  
Brittany Hudson  
Madison Elizabeth Hytinen  
Dani Jabado  
Erika John  
Kierra Johnson  
Sharleeta J. Judson  
Mariah Kahn  
Jamie Elileen Larsh  
Chelsea Leiger  
Sara Majeed  
Crystal Mcconnell  
Laura A. McNew  
Haley Anne Mulder  
Amber Murray  
Lakeisha Merie Patron  
Alexis M. Priola  
Shanice Leigh Robinson  
Rochelle Marcella Rock  
Abigail Rogers  
Sean J. Scalsky  
Prabhjot Singh  
Bianca Idalis Nicole Spaulding  
Casey Morgan Spencer  
Geillawit Tamrat  
Chelsie Testerman  
Adante Thompson  
Gabrielle Vita  
Tia Nicole Walker  
Kyle Spencer Williams

Graduate Students

JenaMarie Baldoia  
Amelia Ann Bussell  
Karen Butler  
Claire Mary Cartozzo  
Hao-Jung “Julia” Chun  
Emely Morales Colon  
Kemper Gibson  
Amanda “Sasha” Hayes  
Alisha Dionne Henderson  
Jessstine E. Horn  
Megan L. Jackson  
Melissa Aileen Johnson  
Tiffany Layne  
Davied Millard  
Renata Costa do Nascimento  
Joseph M. Parian  
April Dorothy Solomon  
Courtney Stankavich  
Nancy Anne Stokes  
Joseph Wesley Stone  
Rebecca Ann Thielen  
Shane Woolf
Outstanding Graduating Students
Academic excellence and Service & Leadership within the department, the university and the community

Graduate
April Solomon and Shane Woolf

Undergraduate
Brittany Hudson and Mariah Kahn

Leadership and Service Awards
Outstanding contribution to the department and the community

Graduate
Kemper Gibson
David Millard
Joseph M. Parian

Undergraduate
Haley Anne Mulder
Christen Victoria Green

Academic Achievement Awards
Cumulative GPA: Grad- 3.85 or higher, Undergrad- 3.7 or higher

Graduate
Claire Mary Cartozzo
Hao-Jung “Julia” Chun
Renata Costa do Nascimento
Courtney Stankovich
Joseph Wesley Stone
Rebecca Ann Thielen
Shane Woolf

Undergraduate
Angela Lynn Brand
Samantha Bosworth
Jenny Waiyu Cheung
Linda Ho
Brittany Hudson
Dani Jabado
Mariah Kahn
Casey Morgan Spencer

Black History in the Making
Student with a stellar academic record, a history of community service, and experiences that place them at the forefront of their careers

April Solomon

Paul B. Ferrara Scholarship
Second year graduate student who demonstrates forensic science research or service contributions which impact the field, a specific forensic science laboratory, or forensic science professionals

David Millard

Emily R. Murphy Scholarship
Graduate student who shows evidence of substantive service to the community in their first year

Shane Woolf

Professional Development Award
Second year graduate student who has an abstract accepted for presentation at AAFS and a record of exceptional performance in research that has the potential to impact the field of forensic science

Tiffany Layne and Emely Morales Colon
It has been an incredibly busy year in the department – all exciting things, but nonetheless a bit hectic! We submitted our self-study to FEPAC in July 2015, hosted the on-site evaluators in October 2016, and received our third five-year accreditation from FEPAC in February 2016! Last year the big story was the renovations in progress and the expansion of our physical space. This year, we have been enjoying the use of that space and renovating even more – namely a lab for Dr. Sarah Williams (Harris Hall South 2003) and a new forensic chemistry research lab to be shared by Dr. Peace and the new forensic chemist we hope to hire soon. New courses were introduced in the 2015-16 academic year as well – namely Dr. Miller’s Laser Scanning class, Dr. Singh’s Forensic Entomology class, and Dr. Simmons’ Developmental Osteology and Advanced Forensic Anthropology classes. We also welcomed two new adjunct instructors to the department – Mr. Frank Curran from Henrico County Police Department, teaching Forensic Pattern Evidence and Dr. Leah Bush, teaching Forensic Medicine.

It has also been a banner year for our graduate students, who have won numerous awards and scholarships from both VCU and national forensic organizations. At the American Academy of Forensic Sciences (AAFS) alone, current VCU faculty and students presented 25 papers, posters or workshops. For awards and honors, congratulations to: Karen Butler, who won the Leo Dal Cortivo Award, recognizing the best platform presentation of the Young Forensic Toxicologists at the annual Society of Forensic Toxicology (SOFT) meeting, and Kemper Gibson who won first place in VCU’s first Three Minute Thesis competition, going on to represent us at the regional competition where he won second place. Concerning scholarships, congratulations to: Shane Woolf, who won the Forensic Science Foundation (FSF) Student Travel Grant Award, paying full expenses to the AAFS meetings in Las Vegas, where he presented two posters; Emely Morales and Tiffany Lane who won the Department’s first ever Professional Development Scholarship, also paying full expenses to the AAFS meetings. FSF travel awards to the AAFS meetings also went to April Solomon, Megan Jackson, Nancy Stokes, Joey Stone, Karen Butler, Melissa Johnson, Rebecca Thielen, Kemper Gibson, and Jena Baldano.

We had an exciting time in February when Max Aguilera-Helweg, a photographer from National Geographic magazine, spent four days in the department shooting part of a story on education in forensic science since the 2009 NAS Report. The June/July issue is out so you can read about it here or pick up a copy at the news stand!
New Technique for Analyzing DNA Sarah Seashols Williams

Virginia Commonwealth University researchers have developed a new technique for analyzing DNA molecules. Their new research article, “Infrared laser heating applied to nanopore sensing for DNA duplex analysis,” suggests the possibility for improving forensic DNA workflows for more rapid and accurate identification. The article was published in the Journal of Analytical Chemistry and appeared online on Feb. 19.

“We are interested in increasing the number of parameters that researchers can tune in order to study small DNA molecules,” said Joseph Reiner, Ph.D., assistant professor of physics in the College of Humanities and Sciences.

“Laser heating has been used in the past, so we applied this methodology to our nanopore technique and found it was effective at discriminating between different sized DNA fragments.”

Nanopore sensing allows researchers to learn about the physical and chemical properties of molecules in solution. A nanopore is a little hole with an ionic current. When it’s introduced in a solution sample, DNA molecules from the solution drift through it, causing the current to change. Based on the current change and also the length of time the molecule dwells in the nanopore, researchers get information about the molecule. In this case, the researchers were interested in analyzing the size of the molecules.

One problem researchers face with DNA nanopore sensing is that the molecules will sometimes remain in the hole indefinitely. Researchers can speed up the drift of molecules in a number of ways, including heating the sample solution. This controls the interaction between the DNA and the pore and enables more accurate identification of the types of DNA molecules in a given sample. There are drawbacks when an entire solution is bathed in heat though, including slow heating and cooling times and solution evaporation.

Infrared laser heating solves these problems because the energy is pinpointed at a very small volume of the sample, which allows for rapid and isolated application of heat. “The laser can localize the heat down onto the pore, which gives us much better control over the frequency of DNA events and the time a DNA molecule remains in the pore. By analyzing each of these events, we hope to characterize the number and size of different DNA molecules in a solution,” Reiner said.

The current method of forensic DNA profile development depends on discrimination of the DNA fragment size, according to Sarah Seashols-Williams, Ph.D., assistant professor in the Department of Forensic Science and co-author on the article. The ability to see varying sizes of the DNA fragments known to differ between people means knowing if the sample includes DNA from one or more people.

This information would serve as a prescreening tool for forensic scientists and allow them to accurately decide a course of action for further analysis and workflow. Currently working without a prescreening method, scientists often are required to waste time and resources and run additional tests to understand the DNA found on evidence.

“Researchers are hoping to provide information prior to the manpower and cost of the traditional analysis method so they can better use resources,” Seashols-Williams said. “That will also help reduce backlogs because they’re able to work more quickly, using only the procedures that will provide information for that sample.”

Faculty Mentor Award Christopher Ehrhardt

Each year, the VCU Undergraduate Research Opportunities Program accepts nominations from students for our “Outstanding Faculty Mentor” Awards. Undergraduate researchers are asked to identify a professor or faculty mentor who regularly goes above and beyond to create and engage students in research opportunities.

Dr. Christopher Ehrhardt, Ph.D., was one of the six awardees. Dr. Ehrhardt’s main interests are in the areas of forensic biology, microbiology, and trace evidence analysis. He currently maintains a microbial culturing facility that he uses to investigate the chemical and biological signatures associated with the production process of illicitly grown bacteria (e.g., Bacillus anthracis, Yersinia pestis). Dr. Ehrhardt’s lab also works on developing new methods for analyzing complex cell mixtures that are recovered as evidence from a crime scene. He mentored VCU Undergraduate Research Fellow, Eva Childrey who states, “Dr. Ehrhardt has an excellent quality of allowing his students the freedom to troubleshoot and logically analyze experimental issues, while still providing direction towards the solution. I have personally gained more technical and mechanical knowledge of equipment and instrumentation within his lab than within any of my teaching lab experiences, including Instrumental Analysis. I have been able to list my experiences with specific instrumentation troubleshooting on my resume, and discuss them with employers with positive outcomes. Dr. Ehrhardt’s persistence in his own research has influenced me to think very favorably of pursuing a career in research for myself. Through his support, I was successful in my applications and am currently preparing for a summer internship in a local Richmond laboratory.”
Undergraduate Spotlight Eva Childrey

Eva began her journey into undergraduate research as a sophomore during the fall semester of 2014. As a double major in Chemistry and Forensic Science, she was very interested in focusing her research interests within the Forensic Science department here at VCU. She found the research of Dr. Ehrhardt to be particularly interesting and successfully completed an independent study within his lab during the spring 2015 semester. The independent study with Dr. Ehrhardt's lab gave Eva her first taste of the research lab environment, along with all its challenges and accomplishments. Her independent study topic examined the characterization and quantification of surface fatty acids from Bacillus spores, and introduced her to a whole new perspective and appreciation of the fascinating interdependency between the disciplines of chemistry and biology. With Dr. Ehrhardt’s sponsorship, Eva applied for and received the UROP Summer Fellowship Program grant for the summer of 2015. She remained in Dr. Ehrhardt’s lab as a UROP fellow for the duration of Summer 2015, where she expanded heavily upon her initial independent study research topic of surface-associated bacterial lipid quantitation. In conjunction with Dr. Ehrhardt, she developed an assay to quantitate the absolute concentration of fatty acids within the whole cell and exosporium portions of Bacillus spores utilizing gas chromatography (GC-FID) and Direct Analysis in Real Time-Mass Spectrometry (DART-MS) over the course of the UROP program. The results from the culmination of this research were presented as a poster exhibit at the American Society of Microbiology Emerging Diseases and Biodefense Research Meeting in Arlington, VA over Feb. 8-10th, 2016, with the support of the UROP Travel grant and a VCU Forensic Science departmental travel grant. Additionally, she presented these results at the VCU Poster Symposium for Undergraduate Research and Creativity in April 2016.

Eva remained in Dr. Ehrhardt’s lab as a research technician, and has been busy expanding further on lipid quantitation and identification and assisting with general lab maintenance. Specifically, she has expanded the DART-MS analysis to examine residual fatty acids from trace samples with the goal of developing a rapid method of identifying taxonomy and original growth conditions of the organism.

Undergraduate research has presented Eva with a phenomenal learning opportunity through practical application of classroom theory and interaction with student researchers and professors across academic departments. However, one of the most unexpected and exciting consequences of her involvement has been through the opportunities that research has presented to her outside of the lab. Eva’s research involvement has allowed her to build critical thinking and communication skills, along with a variety of applied laboratory experiences that provided her a unique position as an undergraduate. Due to her research experience as an undergraduate, Eva was eligible to apply for the Barry M. Goldwater 2016 Scholarship and was nominated as one of VCU’s 2016 campus nominees. Research involvement has also done great things for Eva’s professional network and has enabled her to make connections across departments and disciplines through interactions with faculty and students. As she approaches her senior year, Eva plans to stay involved in research here at VCU for the duration of her undergraduate academic career and hopes to successfully take her experiences and knowledge further into academia as she pursues a Ph.D. in Biochemistry after graduation.

Graduate Spotlight Tiffany Layne and April Solomon

On a busy Tuesday winter morning, graduate students, April Solomon and Tiffany Layne, were eagerly awaiting the arrival of two individuals: Kelly Knight (Assistant Professor at George Mason University) and Tom Neer (retired FBI profiler)! The VCU Forensic Science Department had a special opportunity to participate in a collaborative effort with George Mason University and a local Japanese television show regarding unsolved criminal cases. This particular Japanese case was known as “The Nishi-ku Nagoya Housewife Murder.” April and Tiffany were both full of excitement and anticipation about what was to come. Upon their arrival, Tom Neer briefed the entire Dawson Cruz-Williams Research Laboratory staff on the case. They learned that the husband had been paying multiple years worth of rent on the apartment where the crime scene occurred. It was a very entertaining introduction, but the entire experience felt surreal as Tiffany and April provided laboratory assistance on a cold case. It was a two day endeavor in the Dawson Cruz-Williams Research Laboratory that they will never forget.

This event granted them real casework experience under a traditional DNA workflow setting. Several evidentiary samples (hair, cigarette butts, etc.) were processed for DNA analysis and they were able to obtain partial DNA profiles from all but two evidence items. Additionally, they reinforced the knowledge base that they received through their academic coursework by providing commentary for the documentary which was due to air in February. They both worked alongside professionals and it was an invaluable opportunity that most graduate students do not get to experience.
Laura McNew

Laura has known she wanted to be a Forensic Scientist since she was 15, after reading a Patricia Cornwell book. During high school, she went to Parris Island to see a friend graduate from Marine boot camp. While there, she felt a strong sense of belonging. When Laura visited several university campuses around Virginia, none of them brought the same sense of belonging that she felt that day at Parris Island. Still unsure of joining the military, she applied to several schools with her heart set on Old Dominion University, (ODU). She was accepted at ODU but decided to join the Marine Reserves for six years and left for boot camp just one month after graduating from high school. By April 2000, Laura had graduated from Marine boot camp, completed all of her combat training, and graduated at the top of her class at military occupational school. Laura then started studies at ODU with the intent to obtain degrees in Biology and Criminal Justice and the plan to become a Marine Reserve Officer and a forensic scientist.

After her third semester, Laura became pregnant with her daughter so she transferred to VCU to be closer to her family. She started part-time in the Forensic Science program in the Chemistry track while working full-time and traveling one weekend each month to join her reserve unit in Newport News. Over the next seven years, she continued to go to school part-time and work full time. In addition, Laura completed training in Okinawa and Osaka, Japan; California, New York, Nevada, North Carolina, Georgia and South Carolina, and was promoted meritoriously to Staff Sergeant. In July of 2009, she took a military leave of absence from work and school. She accepted active duty orders to North Carolina with an Intelligence battalion with whom she later deployed to Afghanistan in 2011. Between 2009 and 2013, she traveled to Kyrgyzstan, Morocco, Germany, and Ireland. Finally, in 2013, Laura decided to continue working toward her BS degree. By that time, she had been promoted to Gunnery Sergeant and the only reserve billet open within her job field and rank was in Marietta, GA. For over a year, she traveled to Marietta every month to drill until an opening was available in Virginia where she remains in the Marine Reserves.

January 2014 was the beginning of the end of a very LONG chapter of Laura’s life!! She became a full time student at VCU in the Forensic Science Chemistry track where she excelled academically and was part of the Peace Forensic Toxicology Research Lab. With the support of her family, she completed her Chemistry degree in December 2015 and her Forensic Chemistry degree in May 2016. Her daughter is now 14, and Laura is so proud to have shared this special journey with her. Her plan is to work in the industry and eventually come back as a grad student in forensic toxicology. Laura states that she is so excited to see what her future holds in a field where she can make a difference.

Brittany Hudson

Brittany has been playing soccer for as long as she can remember. In fact, many sports have been a huge part of her life; she played basketball, tennis, and volleyball in high school, but soccer was always a constant. Coming from a very small county with one high school made it difficult to obtain a position on a varsity team for college, especially since she wanted to major in forensic science. When Brittany toured VCU and fell in love with the school and the Department of Forensic Science, she realized that she would have to sacrifice soccer for her education. However, upon coming VCU and attending the SOVO Fair, she realized that club soccer was a possibility and that she could continue to play the sport that she loved.

Playing club soccer for the four years that Brittany attended VCU really helped to keep her in shape, of course; it was like going to the gym to workout but less formal and more appealing. Club soccer was a level between travel soccer and varsity soccer; they traveled to other schools to play their club teams, but they didn’t have the time commitment requirements of the varsity level (such as practice every morning at 5:00 a.m.). This meant that she could truly focus on her education while playing competitive soccer for fun. Varsity soccer would have ultimately taken away from her studies.

Club soccer also served as an avenue for many other important aspects of Brittany’s college life. For example, she was able to take breaks from my studies by playing soccer; it served as a mental hiatus and sometimes enabled her to let go of my frustrations and stress. She was also able to gain and maintain some of her closest friendships through playing club soccer. In addition to helping her maintain her sanity and develop friendships, club soccer helped to strengthen Brittany’s leadership skills. She served as co-captain and treasurer for three of the four years that she played soccer with the team, which meant that she ran practices, planned events, and served as a leader. This enabled her to become more involved on campus through communications with personnel within the Cary Street gym and through recruiting and social events. Serving as the treasurer for the club ultimately taught Brittany how to better manage funds, which is a skill that can be used throughout life.

Brittany believes that deciding to come to VCU and to play club soccer were two of the best decisions of her life. Not only was she able to take part in an amazing forensic science program, but she was also able to continue playing soccer without it impacting her academics. For her, staying busy is the best way to ensure that she stays on task. Majoring in both forensic science and criminal justice probably would have been enough to keep her busy, but taking part in a club sport further added to her schedule while also ensuring that she had a bit of fun. For anyone who is shy, who loves a certain sport, or who simply wants to become more involved on campus while also having fun, Brittany would definitely recommend becoming a part of the club sports community at VCU. It definitely exposes one to friendships and leadership opportunities, it creates some lasting memories, and it beats staying in the dorms or simply going to the gym alone.
International Spotlight  Jennifer Le, BS ‘13

While working for MRIGlobal in January 2016, Jennifer had the opportunity to travel to Sierra Leone to help with the Ebola response. The Ebola diagnostic lab program began in early 2015, almost a year after the outbreak started - delayed by many challenges to overcome. By the time Jennifer landed, boots on ground, the country had been declared Ebola free for over 60 days. Her team worked in mobile labs, which were mostly biosafety cabinets inside a Conex box. The lab functioned 7 days a week. Every day they would put on a full Tyvek suit and enter the mobile lab to start processing samples. They performed everything in one day, from aliquoting samples to finishing PCR.

The FRSC program at VCU really helped Jennifer through the lab work in Sierra Leone, starting with the chain of custody forms – and also being so diligent about contamination! They monitored the lab every day for contamination so those tough days in FRSC Molecular Bio Lab really paved the way in developing clean lab habits.

Although the country was declared Ebola free, the lab was busier than when it was Ebola positive. This was to keep the country free of the virus and monitor any suspected cases. Unfortunately, in late January a new case rocked the country and everyone was back on their toes. It was a scary thought knowing this disease could again infect people after so much work was done to eliminate it. Jennifer had a few moments where she was holding one of the deadliest viruses ever known to man. It was a rewarding experience, but also very scary.

Jennifer also had the opportunity to meet people from other countries/labs including the CDC and the Italian Lab that took part in the Ebola Response. There was a big supportive community for all those working in lab/healthcare related to Ebola. They were welcomed with open arms (figuratively, no touching!) by many of the locals who were happy to see them helping battle the disease. Jennifer was also able to take part in training local students in operating a lab with BSL-3 practices. These were young, aspiring scientists who also want to make a difference in stopping and preventing Ebola in West Africa. It was cool to interact with them and learn more about their culture all while teaching them the skills she learned while at VCU and in post grad lab work.

Five months in Africa is a life changing experience. After seeing how one disease wiped out thousands, it was rewarding to take part in helping them recover. Also seeing how happy the locals get over the smallest things has changed Jennifer’s mindset on life. She is happy to see Sierra Leone and West Africa finally close in on the fight against Ebola and all the aspiring students who work so hard to help their country, yet she hopes they never have to battle something like that again.

Alumni Spotlight  Alumni Visits

If you follow us on Facebook, you have seen former students who dropped by to visit. We love to see our alum and catch up with what has been happening since graduation. Most of our visitors are amazed by the transformation of the department, especially if they were in the program prior to the move to Harris Hall South. With our eleven faculty and staff, four teaching labs and classrooms, seven research labs and two shared instrumentation labs, it's hard to believe that it was less than 13 years ago when we were a department of three. So, come by and visit, see the department and have your picture taken so that others can guess who stopped by the department!

For our alum who prefer a more structured setting, we have had receptions here at VCU and at the SOFT and AAFS meetings for our alumni and friends of the department. Be sure that you know about these events and get an invitation by letting us know how to get in touch with you at VCU Alumni Association.
A Closer Look at What's Been Keeping Us Busy

Department Research

Forensic Anthropology and Entomology

- Working on time since death estimation through accumulated degree day correlation with total body score and also the microbiome (Simmons, Singh)
- Human identification project based on trace element analysis of tooth enamel (Simmons)
- Work on mitochondrial DNA sequencing of human DNA recovered from maggot crop contents. (Singh)

Forensic Biology Research

- Evaluation of the use of the miniION, a portable massively parallel DNA sequencing device that is about the size of a USB, with forensic DNA samples (Seashols-Williams, Dawson Cruz)
- Development and refine an STR genotyping screening assay utilizing high resolution melting curve analysis (Dawson Cruz, Seashols-Williams)
- Work with the Ion Torrent PGM, a Next Generation Sequencing instrument, analyzing both an Ancestry Panel and a STR Panel for human DNA samples (Dawson Cruz)
- Study the use of microfluidics to perform differential extraction (separation of male and female cells) on a small chip device. This process is important for sexual assault cases to reduce processing to a fraction of the time. (Dawson Cruz)
- Study the abundance and viability of DNA left behind on glass substrates after visualizing and tape-lifting latent fingerprints. (Dawson Cruz)
- Test the efficacy of a novel DNA typing system, Innotyper 21 from InnoGenomics Technologies, LLC. (Singh)
- Evaluation of the impact of different embalming method on microbiome associated with human cadavers using metagenomic approaches. (Singh)
- Development of a long-term postmortem estimation (PMI) method using microbial evidences. (Singh)
- Study the relative stability of nucleic acids under environmental and chemical exposure (Seashols-Williams)
- Identification of RNA markers for phenotypic characterization (Seashols-Williams)
- Nanopore sensing of DNA molecules for mixture deconvolution (Seashols-Williams)
- miRNA detection for forensic body fluid ID (Seashols-Williams)
- Validation of mRNA markers for body fluid identification (Seashols-Williams)

Crime Scene

- Analyze potentially damaged bloody footwear impressions (Miller)
- Laser scanning (Miller)
- On-scene instrumental identification of physiological fluids (Miller)

Forensic Chemistry

- Research the efficiency of drug delivery, both licit and illicit, using electronic cigarettes. The particular drugs of interest are nicotine and methamphetamine. (Peace)
- Characterize new electronic cigarettes such as the rebuildable dripping atomizers (RDA) (Peace)
- Characterize electronic cigarette coils. The goal is to characterize the electronic cigarette’s temperature output over time as the power and wire thickness are changed and to observe how the changes affect the structure and build of the coils. (Peace)
- Develop analytical tools to measure the drug content and concentration in the vapor and residues remaining on the e-cig using GC-MS, Solid-Phase Microextraction (SPME), UPLC-MS/MS, and DART Accu-TOF MS. (Peace)
- Investigating the abundance and diversity of fatty acids in Bacillus ACT spores (anthracis, cereus, thuringiensis) and developing highly sensitive mass spectrometry methods to quantitate fatty acids for in evidence recovered from biocrimes. (Ehrhardt)
- Examining genetic and physiological indicators for growth environment/history in Yersinia pestis. Investigate how these signatures may be used to understand epidemiology of plague ‘hot spots’ around the world and to improve biosurveillance capabilities. (Ehrhardt).
- Investigating biochemical variation in human cell types and examining how this information can be used to improve forensic biology techniques. (Ehrhardt)
- Detection, differentiation, and persistence of shampoo and conditioner residue on hair by Direct Analysis in Real-Time AccuTOF mass spectrometry. (Hazelrigg)
- Detection and classification of hair dyes by Direct Analysis in Real-Time (DART) (Hazelrigg)
- Detection and characterization of surface treatments of fibers by Direct Analysis in Real-Time (DART) (Hazelrigg)