Natural and Applied Sciences

ANNUAL REPORT
FISCAL YEAR 2018-19

LOYOLA COLLEGE
OF ARTS + SCIENCES
Natural and Applied Sciences (NAS), a thriving community of teacher-scholars, dedicated staff, and talented students is supported by committed alumni, devoted advisory boards, highly-valued industrial partners, generous donors, and the leadership of academic affairs and the University. Our innovative minded faculty are fostering academic excellence. We introduced three new, relevant and flexible majors in fall 2018, and two more in fall 2019. NAS has a strong presence on our campus with 24% of undergraduates majoring in math, sciences, and engineering and nearly 600 undergraduates taking part in the Pre-Health programs. NAS offers the two largest interdisciplinary minors at Loyola: Forensics Studies and Environmental Studies.

The growth of the innovation ecosystem at Loyola is intertwined with NAS programs and efforts. This include Pathways to Innovation initiative as a framework for nurturing innovation and entrepreneurial mindset, supporting the University-wide minor in innovation and entrepreneurship, offering co-curricular programs such as pop-up classes, participating in the expansion of maker spaces, organizing the University Innovation Fellows (UIF) program, and fostering innovative learning opportunities through co-curricular and student clubs.

NAS annual events and programs are promoting a stronger sense of NAS community. Hauber Summer Research program represents the major summer activity on our campus, Grand Seminar is now a signature university event, Celebration of Science week helps advocate for the role of sciences, Cosmos and Creation offers a forum for dialogue about science and society, CPaMS serves talented students majoring in math and science, and Health Outreach Baltimore and Baltimore Health Immersion have measurable impact on our students and the greater Baltimore community.

The success of our faculty and students represents a strong source of pride. This includes student success in post-graduate and professional programs, and demonstrated intellectual curiosity that embody the Loyola experience, high-quality liberal arts education, and the care for the whole person. We rejoice at the success of our faculty as the intellectual leaders in our campus based on their research, scholarship, and grant activities, and their support for fostering academic excellence and student mentorship.

We look forward to leveraging opportunities in the next academic year that help us to achieve and to enhance the success of NAS through fostering academic excellence, enhancing research and scholarship, and empowering students. The strong support from the Dean of Loyola College of Arts and Sciences, Stephen Fowl, Ph.D., Provost and VPAA, Amanda Thomas, Ph.D., and the University administration and leadership are key to the success of NAS programs.

Bahram Roughani, Ph.D.
Associate Dean, Natural & Applied Science
Biochemistry (B.S.) – approved by MHEC and will be officially offered starting AY 2019-2020.

Data Science (B.S.)
Forensic Studies (B.A.)
Physics (B.A.)
Dual Degree in Physics (B.S.) and Engineering (B.S.E.)
Since 2011, the natural and applied sciences has hosted a yearly seminar with the goal of engaging Loyola students as well as providing an enlightening and informative event for the greater Loyola community. Past speakers have included decorated thinkers and scientists including Nobel Prize recipients.

In fall 2018, Peter Lu, Ph.D., physics research fellow at Harvard University presented Modern Math in Medieval Islamic Architecture.

For more information about the Grand Seminar, visit Loyola.edu/grandseminar.

Announcing the Choudhury Sarkar-Dey Support Fund for the Natural and Applied Sciences

Established through the generous philanthropy of Professor of Mathematics and Statistics, Dipa Sarkar-Dey, Ph.D., a portion of the fund will support students in the natural and applied sciences and part will fund the Choudhury Sarkar-Dey medal, the first divisional medal at Loyola University Maryland. This medal will be presented to an exemplary undergraduate senior majoring in the sciences who shows commitment to diversity and engagement with community service and justice.

Program Stats and Innovations in the Natural & Applied Sciences

Pre-Health Programs
Loyola’s vibrant Pre-Health community consists of 588 students participating in numerous pre-health clubs and societies, service to the community, advising and committee preparation for medical, dental, and other health profession graduate programs. Student success rates placed well above the national average for 2019 with 59% applicant success for medical and osteopathic schools (39% national average) and 60% applicant success for dental schools (41% national average).

Pre-health students continue to positively impact the Baltimore community through outreach and service-learning programs. During 2018-2019, 31 student volunteers assisted three departments at Mercy Medical Center through Health Outreach Baltimore. A total of 431 clients were assisted with 1,414 resource requests during a total of 2,068 service hours. The Baltimore Health Immersion Program, marked its fifth year in 2019, integrating coursework and service-learning to partner 14 Pre-Health students with nine community partners during the intensive five-week summer program.

Data Science
In 2018, Loyola launched the first data science major for undergraduates in the state of Maryland. The interdisciplinary program with computer science, mathematics and statistics, and information systems currently has 10 majors and 15 minors. The Data Science Career Insights Panel Event hosted at Loyola in spring 2019 included networking and an expert panel discussion featuring data science professionals from a variety of industries.

Forensic Studies
A Forensic Studies major (B.A.) was approved in spring 2018 and implemented during the 2018-2019 academic year along with an advisory board and seminar series. The program is growing quickly. Six Forensic Studies first-year students began this fall and a number of current students are expected to declare Forensic Studies as their major. The Forensic Studies minor program continues to grow and is currently the largest interdisciplinary minor at the University with a current enrollment of 55 students.

Environmental & Sustainability Studies
Environmental and sustainability studies is the second largest interdisciplinary minor at the university with 50 students currently enrolled.

Program Reviews and Accreditation

- The first round of targeted program reviews for all NAS programs was initiated in 2015. A targeted internal program review was completed for biology in spring 2019.

- Additionally, the chemistry program is certified by American Chemical Society every six years with recertification due in 2020.

- The computer science and engineering programs are ABET accredited every six years, last received in August 2018.
Awarded & Active Grants

Lisa Scheifele, Ph.D., received a $499,944 National Science Foundation (NSF) grant for The Build-a-Genome Network.

Theresa Geiman, Ph.D., is in year four of five for an National Institute of Health (NIH) grant for the Nathan Schnaper Summer Intern Program in Cancer Research ($33,569).

David Rivers, Ph.D., received an NIH grant for Loyola Forensic Academy via subaward from University of Maryland Baltimore ($10,812). The academy will be a one-week summer module focused on forensic science, relying on hands-on activities, discussions, and presentations from the Baltimore City Police Forensic Unit, ATF agents, and local forensic experts. Alan Thoms-Chelsey, Ph.D., will assist in the development and implementation of this program. The first-year award is for $10,812. Subsequent awards for the same amount are expected over the next three years.

M.S. Raunak, Ph.D., has received a research grant of $68,613 from the Information Technology Laboratory (ITL) of the National Institute of Standards and Technology (NIST) for the year 2018-19. Under this grant, Raunak will work on developing and analyzing new strategies and techniques for finding bugs and anomalies in software systems that are generally difficult-to-test such as cryptographic programs. This is the second research grant for Raunak from NIST ITL. Previously he received research grants to study workflow-based systematic testing of information systems software.

Submitted Grants

Student Achievements in the Natural & Applied Sciences

• Loyola’s VEX U team competed in the West Virginia VEX U Qualifying Tournament at Fairmont State University in March, successfully building two robots with new V5 hardware system and winning one match.

• Loyola’s UAV team participated in the AUVSI SUAS Competition on June 15, 2019 at the Patuxent River Naval Air Station in Maryland. Placing 25 out of 75 teams, the team was awarded a total of $700 in prize money, including $200 for flight, $250 for autonomous flight, and $250 for waypoint capture.

• Loyola’s Robotics club launched Robot Road Trip in 2018-19, an outreach program with local area schools teaching 4th – 8th grade students basic engineering skills, encouraging life and academic skills and helping to enlighten young minds about STEM careers and opportunities.

Loyola computer science and applied math double major, Nicole Schneider, ’19, and biochemistry major, Justin Montague, ’19, both received prestigious Fulbright Scholarships. Nicole will conduct machine learning research in Italy. Justin will conduct public health research in Chile.

Biochemistry major and 2018 Hauber Fellow Hannah Lamond, ’20, received a RISE Internship in biology to conduct research in Germany during Summer 2019.

Biology major and 2019 Hauber fellow Kathryn Lackey, ’20, presented her abstract and poster, “Black Tea May Impact Macrophage Migration to a Site of Infection” to some of the best microbiologists and immunologists in Maryland and received the 2nd place J. Howard Brown Award among all undergraduates in the state.

Physics and mathematics major Zachary Metzler, ’20, was awarded the Barry Goldwater Scholarship for 2019, the most prestigious undergraduate scholarship in the natural and applied sciences in America.

Biology major Shawn Diertl, ’19, received the prestigious Whelan Medal for highest GPA in the University at 2019 Commencement.

Biology majors Christina Kingsley, ’19, Kathryn Lackey, ’20, and Alyssa Hubal, ’20, presented their research at ASM Microbe 2019, the largest gathering of microbiologists in the world, in San Francisco from June 20—24, 2019. Christina was a 2018 Hauber fellow while Kathryn and Alyssa were both 2019 Hauber fellows researching the effects of black tea, acai, and aronia on the immune system with Christopher Thompson, Ph.D.
Faculty Achievements

On July 2, 2018, Sibren Isaacman, Ph.D., spoke at a discussion held by The Center on Privacy and Technology at the Georgetown University Law Center about cellular data collection and retention in the wake of a recent Supreme Court ruling that police generally need a warrant to obtain a person’s cell phone location data from a company.

David Binkley, Ph.D., and Dawn Lawrie, Ph.D., were awarded the Most Influential Paper Award – 10-year retrospective at the International Conference on Software Engineering (ICSE) in May 2019 at Montreal, Canada.


Chet Pajardo, ’20, electrical engineering major, and David Hoe, Ph.D., co-authored a technical conference paper, “Implementing Stochastic Bayesian Inference,” that were published in the proceedings of the IEEE Midwest Symposium on Circuits in August 2019. Chet began his research that forms the basis of this paper as a Hauber fellow during summer 2018.

Robert Pond, Ph.D., has been elected as a Fellow of the American Society of Materials International.

Lisa Scheifele, Ph.D., was named a Scientific Teaching Mentor for the 2018-2019 academic year for her excellent work as a group facilitator at the 2018 Summer Institute on Scientific Training at the University of Connecticut.

David Rivers, Ph.D., received the 2019 Faculty Award for Excellence in Transformative Teaching as well as Distinguished Scholar of the Year at Loyola’s Annual Faculty Excellence Awards ceremony.

Roberta Sabin, Ph.D., spent January 2019 in Kampala, Uganda, as a Fulbright Specialist where she helped the Oasis Book Project, which prints native-authored children’s books and promotes reading among school children, to establish a database for their organization.

A 2018 article by Bahram Roughani, Ph.D., associate dean for natural and applied sciences, along with one of his colleagues at Kettering University, published in the research journal, Materials Science & Engineering B, and was recently reviewed in Advances in Engineering, “Shining light on the off-axis single crystalline Si.”

Megan Olsen, Ph.D., and M.S. Raunak, Ph.D., co-authored Chapter 8—Quantitative Measurements of Model Credibility in the book Model Engineering for Simulation as well as the journal article “Increasing Validity of Simulation Models Through Metamorphic Testing” published in IEEE Transactions on Reliability, the preeminent journal of IEE reliability society.

Aleah Holmes, technical staff in the biology department, co-authored an article published in the Journal of Bacteriology, “Extragenic suppression of elongation factor P mutant phenotypes in Erwinia amylovora.”

Research on Antarctic sea spiders by, Steven Lane, Ph.D., was highlighted in published and online versions of National Geographic.

Lisa Scheifele, Ph.D., and Jesse More, Ph.D., were selected as members of Loyola’s first cohort of High-Impact Practice teaching fellows.

Alumni Achievements

National Human Genome Research Institute (NHGRI) intramural researcher Adam Phillippy, Ph.D., ’02, will receive the Presidential Early Career Award for Scientists and Engineers (PECASE) for his pathbreaking work on single-molecule DNA sequencing that is allowing for the assembly of complete genome sequences. Such assembly will help finish the remaining gaps in the human reference genome, which has a clear benefit to the study of genetic disorders. Phillippy is a computer science graduate and advisory board member. According to the White House, the PECASE is the highest honor bestowed by the U.S. government on outstanding scientists and engineers who are beginning their independent research careers and show exceptional promise for leadership in science and technology.
**Natural & Applied Sciences Events**

**Hauber 30th Anniversary Reception**
Tuesday, Oct. 30, 2018, – prior to the Grand Seminar celebrated 30 years of the summer research program with special recognition for supporters and 2018 poster displays.

**STEM Career Fair**
On Wednesday, Oct. 10, 2018, the STEM Career Fair was a collaborative effort between Loyola’s College of Arts and Sciences and the Career Center, connecting 112 students with 19 reputable STEM-focused employers and learn about full-time, part-time, and internship opportunities at the 2018 fair.

**37th Annual Cosmos & Creation Conference**
Held on June 8-9, 2018, featured keynote speaker Michelle Francl, chair and professor of chemistry at Bryn Mawr College and adjunct scholar at the Vatican Observatory, discussed the topic “Are scientists mystics?”

**2018 Hauber Summer Research Fellowship Program** brought together 14 students across all NAS departments to engage in undergraduate research with faculty mentors supported by the endowed account as well as contributions from Whiting Turner, Grace, the Lowe Family and CPaMS.

**Celebration of Science Week**
During spring 2019, highlighted student clubs and NAS programs with events including a Forensic Studies seminar and data science networking event and panel discussion.

**Community Involvement**
Throughout the 2018-19 academic year, NAS departments engaged with the local community through hosted and organized events. Engagements included computer science faculty Megan Olsen, Ph.D., organizing a mobile application builder workshop for high school women. Other outreach was conducted by student-led clubs, such as the robotics club’s Robot Road Trip, during which, Loyola students visited local area high schools. Health Outreach Baltimore, celebrating their fifth year, also partnered locally by working with Mercy Medical Center. Finally, pre-health students hosted the annual Red Cross Blood Drive in April; collected over 100 pairs of eyeglasses through a separate glasses drive; and donated over one-thousand dollars in food and baby supplies to Mercy Medical Center.

Additionally, the NAS division hosted several summer programs for the community including:
- Engineering Innovation, 2018-2019, led by Suzanne Keilson, Ph.D.
- Beat the Streets Baltimore, 2018-2019, led by Suzanne Keilson, Ph.D.
- Camp BaltiCode 2018, led by Megan Olsen, Ph.D.

**National Conference**
On July 25-27, 2018, a national physics conference entitled the Third Conference on Laboratory Instruction Beyond the First Year (BFY III) was held at Loyola University Maryland. The theme of the conference was “3D Physics: Integrating Experiment, Theory, and Computation.” The conference was sponsored by the Advanced Laboratory Physics Association (ALPhA) and organized by Mary Lowe, Ph.D., with co-chair Joe Kozinski (Lewis University) and supported by Physics lab manager Barry Dalrymple. There were 200 attendees and vendors from the United States, Canada, and Europe. The participants of BFY III shared laboratory curricula, teaching methods, and experiments for a wide range of contemporary physics experiments at the intermediate and advanced level. A distinctive feature of BFY III was the eight hours of hands-on workshops led by faculty, technical staff, and vendors. These workshops occupied most of the teaching spaces in Knott and Donnelly. A model now exists at Loyola for hosting other large scientific conferences.
Loyola College of Arts and Sciences is grateful for the continued support of our alumni, community and friends. This past year we raised just over $1,000,000 in philanthropic support for our college. Highlights of new programs and scholarships that are a result of our philanthropy are: a new endowment for scholarship support towards graduate programs in Psychology made through an estate, the first ever endowed medal for our Natural and Applied Sciences division, a new programmatic fund for our Fine Arts department, a new career support initiative for our fine arts students and grant support for a training initiative between our Speech Language Hearing Sciences Department and School of Education. We rely on the incredible support for all of our program and scholarships and we are grateful to all who have supported our students, faculty, staff and college.

Thank you.