



Office of Research and Sponsored Programs

2018 Annual Report



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ASSISTANT DIRECTOR

Stephen L. Williams, CRA

BUSINESS SERVICES SPECIALIST

Elisa Burton

MISSION

Wake Forest University's Office of Research and Sponsored Programs supports the Associate Provost for Research and Scholarly Inquiry in building faculty research programs of nationally recognized excellence. We assist faculty in their pursuit and management of sponsored activities; work to assure ethical research achievement, especially involving human subjects, in compliance with all relevant laws and regulations; protect the university's interests; and acknowledge and publicize faculty distinction.

CREDITS

The Office of Research and Sponsored Programs gratefully acknowledges photographs by Jeanie Baird (cover photo), Ken Bennett and Stephen Williams.

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From The Executive Director

Dear Researchers,

I am happy to report that awards received from external sponsors once again passed the \$10 million mark. In FY18, faculty and staff received \$10,028,275, not including gifts or fellowships.

The research landscape at the Reynolda Campus continues to evolve. Faculty in the new Department of Engineering and Center for Functional Materials received awards, and the first proposal submitted by faculty in the Interdisciplinary Performance and the Liberal Arts Center (IPlace) was rewarded.

We can highlight only a few of the many exemplary projects, so we focus on the most competitive, prestigious awards; new investigators' projects; or projects of wide interest. The projects noted below are also summarized later in our report.

Gloria Muday led a cross-disciplinary team, including David John, William Turkett, and James Norris, in securing a large collaborative grant from the National Science Foundation for the Center for Molecular Signaling.

Cynthia Gendrich and Christina Soriano submitted an application that will launch WFU's first performance supported by the National Endowment for the Arts (NEA).

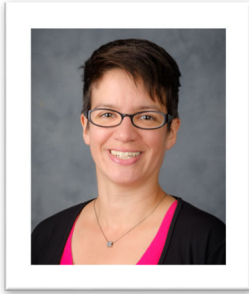
Jeff Katula and Michael Berry (collaborating with Daniel Kim-Shapiro and Gary Miller) each received funding for industry-sponsored clinical trials.

In the Office of Research and Sponsored Programs, Assistant Director Stephen Williams renewed his Certified Research Administrator (CRA) credential for 5 more years. In addition, he co-presented a session, "Using Face-to-Face and Online Communications to Disseminate Information," at the Pre-Award Research Administration Conference of the National Council of University Research Administrators. Human Subjects Protection Specialist Jeanie Baird renewed her Certified IRB Professional (CIP) credential for 3 more years, passing a rigorous 4-hour examination. Congratulations, Stephen and Jeanie!

Sincerely,
Lori Gabriel



Outstanding Projects



ANTHROPOLOGY

Mary Good, Assistant Professor of Anthropology has won a Spencer Foundation Small Grant award for *Learning “Entrepreneurship” but Preserving “Tradition”: Tongan Youth Moving into Employment*. Tonga, a Pacific island nation, is changing from a primarily subsistence-based economy to a global, capitalist system. Young people see new opportunities but feel new pressures; the number and types of jobs available to them do not always meet their needs or match their goals for the future. In response, nongovernmental organizations and government ministries are promoting “entrepreneurship” and “small business development” as innovative ways to combat youth unemployment and ignite “professional success.” Drawing on transnational funding and foreign educational models, training programs teach the basics of small business as well as neoliberal techniques of self-discipline, efficiency, and rational individualism that contrast with traditional culture.

This project investigates the experiences of Tongan youth as they strive to achieve success in business while becoming responsible, traditional Tongans. Its qualitative methods are designed to uncover how particular forms of education intended to ease the school-to-work transition create challenges to constructing cultural identity and the strategies Tongan youth develop to make sense of the apparent contradictions.

BIOLOGY

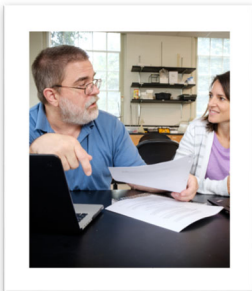


Matthew Fuxjager, Assistant Professor of Biology, has received a three-year award from the National Science Foundation’s Research at Undergraduate Institutions (RUI) Collaborative Research program to study *The Neuroendocrine Basis of Gestural Display Evolution*. The signals animals use for social communication and advertisement are vital to survival and reproduction, but although their evolution has been studied extensively, little is known about their neurobiology, particularly how neural and neuromuscular architecture changes in response to new signals.

This project will be the first to explore “bottom up” modification of neuromotor circuitry as a mechanism for regulating a complex and ecologically relevant motor behavior. It will combine molecular, behavioral, and comparative approaches to test how androgenic hormone systems in certain neuromotor networks change

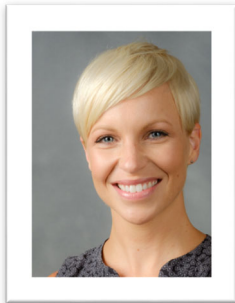
with the evolution of signaling in frogs. The preliminary data show that the emergence of a signal produced by conspicuously waving the hindlimb, known as the “foot flag”, is marked by a ten-fold increase in the androgenic sensitivity of the skeletal muscles that control it. The team hypothesizes that, first, changes in the expression levels and patterning of androgen receptors (AR) at several levels of the hindlimb neuromotor pathway are associated with foot flagging, and second, the spinal motor circuitry that controls the movement depends on androgenic signaling in the leg muscles. To test the first hypothesis, the abundance and distribution of AR in the leg muscles and spinal cords of unrelated frog species that foot flag will be compared to those of their closest relatives that do not. The second hypothesis will be tested by measuring whether blocking peripheral (muscular) ARs in the foot-flagging frog *Staurois parvus* influences the size and connectivity of its spinal hindlimb motoneurons and whether these effects are related to changes in foot flag frequency or kinematics.

BIOLOGY



Dan Johnson, Teaching Professor and Core Curriculum Coordinator in the Department of Biology, has won a three-year award from the National Science Foundation to support *Engaged Student Learning, Exploration, and Design: Accelerating Student Scientific Writing Mastery using Electronic Support and Tailored Feedback*. The project will test a new resource developed at WFU, the STEM Automated Writing Help Tool (SAWHET), which uses statistical and lexical analysis to evaluate student writing exercises and provide detailed, actionable, formative feedback. Combining SAWHET with one-on-one instructor feedback, the program aims to accelerate student mastery of scientific writing and improve instructors’ grading consistency and efficiency.

Its wider aim is to encourage adoption of evidence-based scientific writing instructional practices. It is the first to develop and evaluate a theory-of-action logic model that stresses the need to integrate writing-process knowledge, guided practice, and routine feedback to build student and instructor confidence and ability. The model can be used to assess the relative efficacy of other instructional strategies and individual student progression to mastery in other fields and at other levels.



BIOLOGY

Sarah McDonald, Associate Professor of Biology, has received National Institutes of Health funding to study *Rotavirus Genome Replication and Virion Assembly*.

Genome replication and virion particle assembly must be exquisitely coordinated within an infected cell to maximize viral multiplication and avert cell-intrinsic defenses. Rotaviruses are RNA viruses that cause severe diarrheal disease in young children, but they are also apt experimental models because they perform these tasks in tandem. This project investigates the early stages of rotavirus assembly and genome replication through detailed and unprecedented structural, functional, and genetic analyses of pre-core replication intermediates (RIs) and their protein constituents. Results will clarify as yet poorly understood processes of rotavirus genome replication and virion assembly and lead to the development of targeted, next-generation rotavirus vaccines that may enhance our ability to engineer viral vectors as therapeutic delivery vehicles to treat human diseases.

BIOLOGY

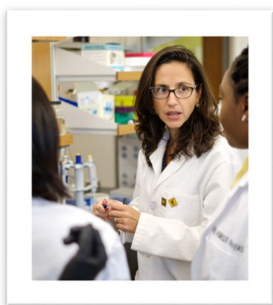
Gloria Muday, Professor of Biology, has won a three-year award from the National Science Foundation for *Ethylene Signaling and Transcriptional Networks that Control Root Development*. This collaboration with Professor David John and Associate Professor William Turkett (Computer Science) and Professor James Norris (Mathematics and Statistics) relies on a model organism, *Arabidopsis*, and new computational approaches to unravel the complex networks of receptors and transcription factors that control changes in plant development mediated by ethylene, a gaseous plant hormone. Building on prior NSF-supported research, the design is synergistic: genetic experiments will help to refine the Bayesian modeling used to identify the patterns and timing of changes in transcript abundance and the transcriptional networks downstream of the five ethylene receptors that regulate distinct aspects of root responses and transcription-factor binding sites.

The resulting computational and mathematical modeling innovations can be applied to identify patterns and networks across organisms and developmental processes. Undergraduate and graduate students will be trained to conduct research at the interface of biochemistry, genetics, mathematics, and computer science. As part of an on-going outreach program, undergraduates will teach Mendelian and molecular genetics to high school students. Grant funds will support the coordination of school visits, assessment of learning outcomes for



both undergraduate and secondary-school students, and program dissemination to other academic institutions.

CHEMISTRY

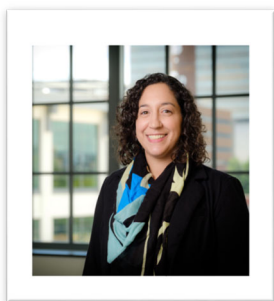


Patricia Dos Santos, Associate Professor of Chemistry, has won a four-year award from the National Science Foundation to study *Redox Reactions in the Biosynthesis of Thio-cofactors in Bacteria*.

Designing studies to elucidate the mechanisms of sulfur activation, trafficking, and insertion into cofactors has proven difficult. All known living organisms use at least a subset of thio-cofactors in various aspects of metabolism; sulfur-acceptor proteins are shared across biosynthetic pathways; and transient intermediates often react with reductants in vitro, skewing the enzymes' kinetic behavior and bypassing sulfur acceptors that are critical to these pathways in vivo. This study will determine the effects of physiological reducing agents on biosynthetic reactions and identify the specific interactions controlling the reactivity of cysteine desulfurases and sulfur acceptors. Results will provide basic knowledge about the role of redox agents in biochemical pathways involving sulfur transfer and establish the evolutionary determinants controlling the reactivity of biosynthetic enzymes.

Undergraduates enrolled in WFU's new interdisciplinary biochemistry and molecular biology program as well as Salem College and Guilford College students, who have fewer research opportunities, will participate in team projects and research training workshops and present their results at local and regional meetings. WFU graduate students serving as co-mentors will improve their communication skills for future careers as independent teacher-scholars.

ENGINEERING



Elise Barrella, Assistant Professor of Engineering, received a National Science Foundation award for *Helping Engineering Students Transfer Knowledge from Multiple Sources to Solve Complex Sustainability Problems*. To advance sustainable global development, engineering curricula must be updated to improve students' real-world problem-solving. Project-based courses offer good opportunities, but undergraduates typically struggle to integrate or build on knowledge from other courses and contexts in their decision-making. Applying cognitive flexibility theory to the complex and ill-structured domain of engineering design, this

project aims to develop and assess learning strategies to enhance students' ability to apply knowledge across various and changing problem contexts.

Specifically, the team will develop and validate assessment methods and instructional approaches by implementing and testing the methods in different program contexts at Wake Forest University, James Madison University, and The Citadel. More broadly, the project will elucidate how students acquire, use, and transfer knowledge about sustainable design to new settings, whether they find careers in academia, industry, government, or nonprofits. It will establish a cross-disciplinary sustainable-design community-of-practice for on-going innovation in instructional and assessment methods that can be transferred across institutions and experiences.

HEALTH AND EXERCISE SCIENCE

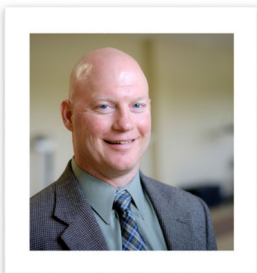
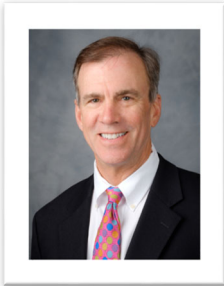
Michael J. Berry, Professor of Health and Exercise Science and member of the Translational Science Center, will use funds from Isagenix International, LLC, to investigate *The Effects of Chronic Dietary Nitrate Supplementation on Constant Work Rate Exercise in High-Functioning Middle Aged and Older Adults*.

Prior research at WFU and elsewhere has shown that nitrate supplementation has positive effects on older adults with chronic diseases, but little is known about its effects on the large population of healthy older adults; specifically, their exercise performance. On the National Health and Nutrition Examination Survey (NHANES; <https://www.cdc.gov/nchs/nhanes/index.htm>), 36 percent of respondents aged between 40 and 49, 28 percent between 50 and 59, and 17 percent between 60 and 69 reported having engaged in strenuous activity at least once in the past 30 days, and even higher percentages reported engaging in moderate activity. Hence, this study will employ a double-blind, placebo-controlled, cross-over protocol to evaluate the effect of short-term nitrate supplementation with a commercially available beetroot juice versus placebo on exercise performance (submaximal constant work rate exercise time) in 20 healthy, high-functioning men and women over the age of 40.

HEALTH AND EXERCISE SCIENCE

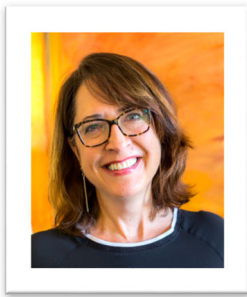
Jeffrey Katula, Associate Professor of Health and Exercise Science, has received an award from Omada Health, Inc., to collaborate with the University of Nebraska Medical Center (UNMC) and Wake Forest Health Sciences on a clinical trial, *Preventing Diabetes through Digital Interventions and Coaching for Translation and Scalability (PREDICTS)*.

According to the Center for Disease Prevention and Control (CDC), about 86



million US adults have prediabetes, and 90 percent of them don't know they are at risk for developing type-2 diabetes within five years (<https://www.cdc.gov/chronicdisease/resources/publications/aag/pdf/2016/diabetes-aag.pdf>). PREDICTS will be the largest single-blind, randomized controlled trial of a digital strategy to prevent diabetes. Using electronic devices – computers, laptops, smartphones, and tablets that can link to wearable fitness devices - Omada will provide access to a personal coach, support group, and weekly interactive lessons on healthy eating, nutrition, physical activity, stress, and sustaining healthy habits. UNMC will randomly assign 600 participants to either the digital intervention or a control group, whose members will attend a live, two-hour class on diabetes prevention. Wake Forest researchers will analyze and evaluate the data on weight loss, blood sugar levels, quality of life, stress levels, and healthcare use between the groups.

THEATRE AND DANCE



Cynthia Gendrich, Professor and Director of IPLACe, and **Christina Tsoules Soriano**, Associate Professor and Director of Dance, both in the Department of Theatre and Dance, have secured a two-year award from the National Endowment for the Arts (NEA) to support *Rethinking Community at Wake Forest University: The IPLACe Forklift Project*.

Since January 2016, IPLACe has collaborated with Austin-based Forklift Danceworks, founded and directed by Wake Forest alumna **Allison Orr**. The company is “inspired by the beauty and grace found in the habitual movement and experiences of everyday people.” For two decades, it has made “dances that highlight the skilled movement of work— washing windows, maneuvering a street sweeper, or climbing an aerial ladder” (Orr, “Artist Statement”). Drawing on her study of anthropology and social work, Orr’s “ethnographic choreography” has been commissioned and supported by an array of prestigious institutions, including the Kyoto Arts Center, MAP Fund, New England Foundation for the Arts, Engaging Dance Audiences/Dance USA, and the NEA.

During week-long visits over several semesters, the company will collaborate with Reynolda campus workers and John Shenette, Associate Vice-President for Facilities and Campus Services, to create a large-scale public dance performance that will grow from their dialogue and interactions and show audiences an immanent, ubiquitous artistry that generally goes unseen. The university will pay volunteer-participants for their work on the project. After the premiere, Forklift will collect feedback. They hope the model can be produced elsewhere, engaging new performers and audiences, and opening discussions on bias, blindness, and the beauty in truth.

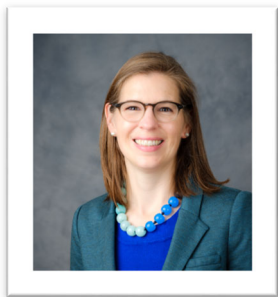
Fellowships



ART

Chanchal Dadlani, Associate Professor of Art History and Z. Smith Reynolds Foundation Faculty Fellow, received a Mellon Author Award from the Society of Architectural Historians for her first book, *From Stone to Paper: Architecture as History in the Late Mughal Empire* (Yale University Press, 2018).

By the eighteenth century, the Mughal Empire was well beyond its supposed golden age. Its control of the Indian subcontinent was increasingly threatened by regional Indian states as well as the encroaching British Empire. In response to a rapidly changing sociopolitical landscape, the Mughal emperors used architecture to harness their illustrious past and stage cultural authority for contemporary audiences. *From Stone to Paper* provides the first in-depth look at this crucial period of architectural history. Discussing a rich array of built forms and urban spaces—from grand imperial mosques to Delhi’s bustling thoroughfares—this book sheds light on long-overlooked buildings. It also explores representations of architectural monuments that circulated in the form of building plans, manuscript paintings, and postcards. Ultimately, the book reveals how Mughal architects, artists, and patrons built on the cultural legacy of their imperial predecessors to create the concept of a historical style identifiable as Mughal.



ART

Morna O'Neill, Associate Professor of Art, has received a Paul Mellon Centre Mid-career Fellowship to prepare her book, *Art and Brutality: British Art and Industrial Manufacture, 1820-1851*. In an 1870 lecture, critic John Ruskin broadly defined industry as production and concluded, “life without industry is guilt, and industry without art is brutality.” William Morris and the Arts and Crafts movement responded with skepticism and rejected industrial methods. Dr. O'Neill’s book looks at earlier perspectives - from the introduction of steel plate engraving in 1820 to the opening of the Great Exhibition of the Works of Industry of All Nations in 1851 – to argue that if fine art was essential to industry in providing a measure of taste, industry was essential to fine art in providing a measure of skill.

Great Britain was the first nation to industrialize and to experience the triumphs and challenges of a manufacturing economy. The book will elucidate the ways in which four artists – John Constable, Daniel Maclise, George Lance, and William Holman-Hunt – reconsidered painting in relation to new forms, such as

Fellowships

photography, and industrial processes based on rote, habit, and calculation. However, the Great Exhibition returned to the firm eighteenth-century divide between the liberal and mechanical arts; its display of fine art was limited to works directly connected to mechanical processes. This decision, overlooking the debates that animated artistic practice from the 1820s, prompted Ruskin's observations and Morris's reaction, as well as the critique of capitalism developed by Karl Marx and Friedrich Engels.



CHEMISTRY

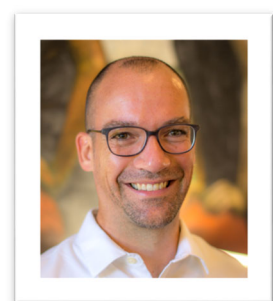
Abdou Lachgar, Professor of Chemistry, has received a Fulbright Scholar Award to collaborate on *Research, Teaching, and Training in Sustainable Materials Development* with faculty and students at three universities in Brazil.

The goal is to help Brazilian graduate and undergraduate students develop as independent researchers focusing on problems crucial to sustainable economic development in their country. Specifically, they will learn how to devise, implement, and evaluate methods to convert waste to bioenergy and to purify water, especially in areas where it is polluted with mercury and other heavy metals due to illegal mining.

HISTORY

Nate Plageman, Associate Professor of History, has been awarded a fellowship by the National Endowment for the Humanities (NEH) to complete his book, *State Planning and City Life in Western Ghana 1900-1970*, a longitudinal study of Sekondi-Takoradi, a small coastal settlement that became Ghana's principal port and first "planned" city. Following its initial design by the colonial state, it went through five master plans and near-constant revision by British authorities and their Ghanaian successors.

As a social historian, Dr. Plageman is interested in everyday experience: how Sekondi-Takoradi's swelling population (from 4,100 in 1900 to 120,000 in 1960) navigated its regimented confines and reshaped them to serve their needs. He will reconstruct the city's past from an array of source materials – archival documents, oral histories, newspaper accounts, private records, photographs, and songs – to show how local imagination and resourcefulness, not simply state initiatives, shaped the city over time.



Professional Development

INTERNAL AWARDS

The Office of Research and Sponsored Programs assists the Associate Provost for Research and Scholarly Inquiry in coordinating and administering internal award programs.

In FY18 there were two deadlines for Pilot Research Grants and one for Collaborative Pilot Grants. Nearly \$112K was awarded for internal grants and bridge funds; funding from the ZSR Foundation provided \$50,000.

Pilot Research Grants \$16,986

Collaborative Pilot Grants \$79,965

Bridge Funds \$15,000

The office also manages matching/cost share funds. Over \$279K was provided in FY18 for sponsored project cost share, open-access publishing, and other initiatives.

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FACULTY DEVELOPMENT

In FY18, the office spent over \$55K hosting and coordinating professional development workshops and events and well as supporting research-related committees. Supported programs and events include:

Recognition of Research Excellence

Reception to Honor Authors, Editors, and Fine & Performing Artists

Creative Research Activities Development & Enrichment Program (CRADLE)

Responsible Conduct of Research Training for Graduate & Undergraduate Students

Building Research Success at Wake Forest University

Winning Grants Seminar Parts I and II

Quality Circle Seminar



Human Research Protection

ORSP provides administrative support to the Institutional Review Board (IRB) under 45CFR §46. Pam Moser, Associate Director for Human Research Protection, maintains IRB records; facilitates communication between the IRB and researchers; coordinates meetings; updates and maintains the university's IRB policies and website; monitors training for researchers and other key personnel; audits approved studies; provides continuing education for IRB members; and keeps the university's Federalwide Assurance and IRB Registration current. She is assisted by Jeanie Baird, Human Research Protection Specialist.

In FY2018, the IRB reviewed 116 new applications (1 full board, 103 expedited review, and 12 exempt). An additional 219 amendments, 195 continuing reviews, and 5 protocol deviations were processed. The highest number of active applications in office history was recorded in January (343). Total active applications for each of the last eight months of FY2018 were the highest recorded for that month. Although the total number of active applications remains high, fewer individual departments or schools are submitting.

The office is proactive, providing study-specific consultations to assist faculty, staff, and student researchers. Group outreach efforts this year targeted Communication and Education graduate students, undergraduate research methods classes in Anthropology and Counseling, and Undergraduate Research and Creative Activities (URECA) grant applicants. We facilitated collaborative research by executing IRB Authorization Agreements and helping nonaffiliated investigators to recruit WFU personnel as study subjects.

Training and support for eIRB, the electronic submission and review system, continued for individual users across campus. Throughout the fall semester, with help from the Academic Applications team at Wake Forest Baptist Medical Center, we worked to revise the Reynolda eIRB application so that the revised Common Rule would be implemented on the scheduled effective date, 19 January 2018. However, on 17 January, the effective and general compliance date was delayed to 19 July, and an additional six-month delay (to 21 January 2019) was announced in June.

The European Union General Data Protection Regulation (GDPR) went into effect on 25 May 2018. It sets strict guidelines for the collection and processing of personal information, including research data, on individuals within the European Union. Our office reached out to the Legal Department to ensure that human subjects research approved by our IRB complies with the new EU rules.



Funding Highlights

In FY18, Wake Forest University researchers received grants and contracts totaling more than \$10 million from external sponsors, not including fellowship support for scholarship in the social sciences and humanities. In addition, faculty and staff submitted a total of 109 proposals, requesting nearly \$45 million.

Consistent with previous years, the vast majority of the funding received was from federal sources. Approximately 83% of awards were federal grants, most notably from the National Institutes of Health and National Science Foundation.

Faculty and staff in the Health and Exercise Science Department received the most funding while the Physics Department submitted the greatest number of proposals *and* requested the most dollars.

During FY18, the following faculty and staff received their first grants at WFU:

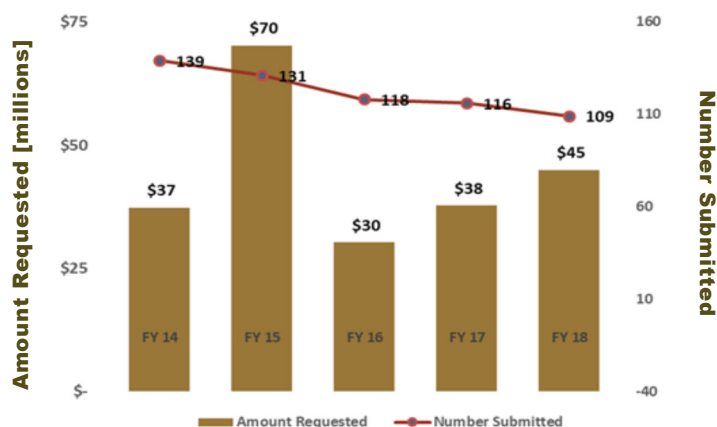
Mary Good, Anthropology
 Aaron Corcoran, Biology
 Matt Fuxjager, Biology
 Sarah McDonald, Biology
 Malika Roman-Isler, Campus Life
 George Donati, Chemistry
 Mollie Canzona, Communication
 Elizabeth Gandolfo, Divinity
 Elise Barrella, Engineering
 Bradley Shugoll, Pro Humanitate Institute

These statistics summarize Reynolda campus sponsored research activity. The graphs include funding processed through the Office of Research and Sponsored Programs and not gifts or fellowship awards made to individual faculty. Awards represent authorization to spend not research expenditures.

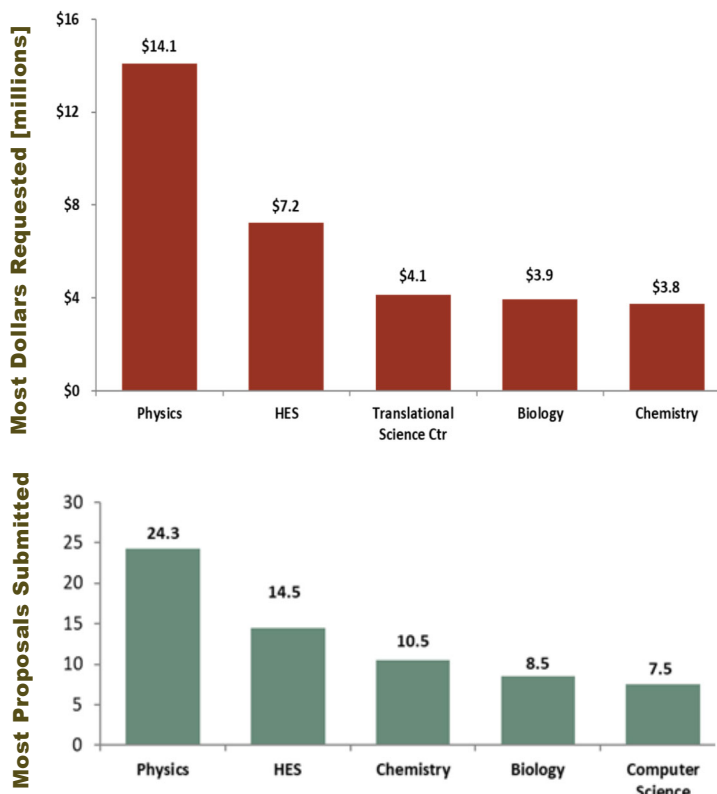
AWARDS BY YEAR: 2014-2018



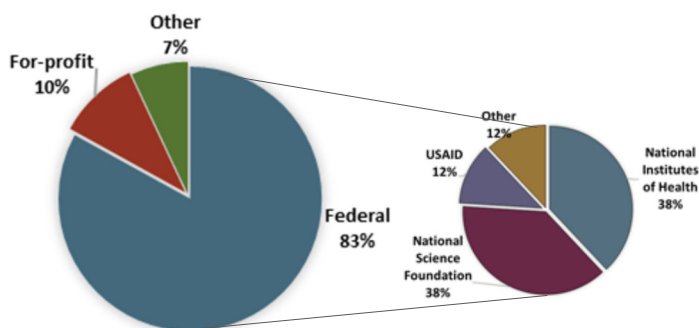
PROPOSALS BY YEAR: 2014-2018



PROPOSALS BY DEPARTMENT



FUNDING SOURCES



Department/Center	Awards	Amount
Health & Exercise Science	18.5	\$2,917,157.40
Biology	9.5	\$2,287,931.35
Physics	14.5	\$ 974,178.03
Chemistry	4	\$ 750,421.86
Center for Energy, Environment & Sustainability	2	\$ 643,406.78
Center for Molecular Signaling	2	\$ 582,073.64
Communication	2	\$ 267,367.84
Divinity	2	\$ 265,000.50
Engineering	2	\$ 211,278.64
Psychology	2.0	\$ 208,335.93
Translational Science Center	1.5	\$ 201,307.48
Mathematics	1	\$ 181,060.32
Center for Nanotechnology & Molecular Materials	1.5	\$ 149,794.16
Theatre and Dance	5.5	\$ 103,022.88
Center for Functional Materials	0.5	\$ 61,654.60
Computer Science	3	\$ 55,149.26
Z. Smith Reynolds Library	1	\$ 50,000.00
Anthropology	1.0	\$ 49,487.00
Sociology	1	\$ 27,623.52
Campus Life	1	\$ 15,000.00
IPLACE	0.5	\$ 12,500.00
Pro Humanitate	1	\$ 8,729.00
Center for Bioethics	0.5	\$ 2,897.28
Philosophy	0.5	\$ 2,897.28



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