

## Iowa State University FY22 Federal Research Funding Overview

Iowa State received a university-record \$198.2 million in federal research funding in FY22, up \$12.2 million, or 6.5% from the previous record of \$186 million set in FY20. The FY22 total also represented an increase of \$43.4 million, or 28%, from the \$154.8 million in federal research funding received in FY21.

A major contributor to Iowa State's record amount of federal sponsored research funding in FY22 was the record-setting support the university received from the U.S. Department of Agriculture (USDA). The \$48.4 million in research funding Iowa State received from the agency in FY22, surpassed the previous benchmark of \$47.8 million established in FY20, and was \$18.3 million, or 60.8%, more than the university received in FY21. Here are additional examples – beyond those mentioned previously – of notable new projects supported through USDA funding in FY22:

- Should a foot and mouth disease outbreak occur, movement of animals between states currently requires agreement between sending and receiving state animal health officials (SAHOs) on a case-by-case basis. A proposed Framework for Interstate Movement Decisions during an FMD outbreak – based on the FMD situation in each state – has been drafted and some input has been provided. This framework is intended to help reduce uncertainty, encourage uniformity and efficiency of safe animal movement. In a two-year project, funded through an award of \$504,563 from USDA Animal and Plant Health Inspection Service, James Roth, Director, Center for Food Security and Public Health at Iowa State will facilitate discussions among a broader group of SAHOs, the animal production industry, APHIS and others to build consensus and develop criteria and documents to support the implementation of the Framework for Interstate Movement Decisions during an FMD outbreak in the U.S.
- Matt Brewer, associate professor and Dr. Frank K. Ramsey Endowed Chair of Veterinary Pathology, received a \$790,000 award from USDA-NIFA to explore new control options for *Tritrichomonas foetus*, a sexually transmitted protozoan parasite that causes costly early embryonic death in cattle. Brewer's research team is pursuing a central hypothesis that a subset of immunogenic peptides from *T. foetus* can be exploited for both rapid field diagnostics and vaccines that could ultimately eradicate the parasite and improve the profitability of beef producers across the country.

In addition to USDA, other agencies contributing significantly to Iowa State's record level of federal funding in FY22 were Health and Human Services (HHS) (primarily the National Institutes of Health – NIH), the National Science Foundation (NSF) and the Department of Defense (DOD). Also worth noting is, Department of Energy (DOE) funding for FY22. The \$67.9 million received this fiscal year was \$20.7 million more than FY21, but that increase was due to the Critical Materials Institute (CMI) at Ames Laboratory receiving its 2021 federal fiscal year allocation of \$25 million during the university's 2022 fiscal year.

HHS funding to Iowa State has increased steadily over the past five fiscal years, and came in at a record \$20.7 million for FY22, up nearly \$2 million, or 10.5%, from FY21. Here are just a few of the more notable Iowa State research projects that received new HHS/NIH funding in fiscal year 2022:

- Curtiss Distinguished Professor of Biochemistry, Biophysics and Molecular Biology, Robert Jernigan, received an initial allocation of \$480,608 of an estimated total award of more than \$2.3 million from NIH's National Human Genome Research Institute (NHGRI). The funds will support a five-year project that will leverage the wealth of data that has come from the proliferation of low-cost genome sequencing to gain a better understanding of disease mutations. The purpose of the project is to apply basic scientific advances in our understanding of protein structures, sequences, dynamics and binding to develop prediction software and databases that can aid directly in clinical disease interpretation.
- Many healthcare workers (HCWs) are placed at risk each day by the Personal Protective Equipment (PPE) that is supposed to serve as their last line of defense against disease. Many harmful pathogens can survive on the surface of PPE and then become aerosolized and inhaled or transmitted to other surfaces, when HCWs remove their PPE. The HHS Center for Disease Control and Prevention (CDC), provided initial funding of \$345,170 to support a four-year project with an estimated total award of more than \$1.7 million to support a Guowen Song-led project to develop better PPE for HCWs. The Norma Scott Lloyd Chair in Textiles and Clothing and his team will employ a novel design approach to develop self-decontaminating PPE that offers superior comfort, fit and functionality, which could result in billions of dollars in savings in healthcare costs.
- Raquel Espin Palazon, assistant professor of Genetics, Development and Cell Biology, received \$393,399 from the NIH National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) in support of a five-year project with an estimated total award of more than \$2 million. [Espin Palazon and her interdisciplinary team](#) are examining a genetic pathway triggered when cells undergo inflammation due to injury or infection that also plays an important role in the development of blood stem cells. The research could lead to the ability to treat blood diseases by regenerating a patient's own blood cells.

NSF funding for new research initiatives at Iowa State has been remarkably consistent over the past five fiscal years with a low of \$30.2 million in FY21 and a high of \$34.8 million in FY18. In FY22, the university received \$33.5 million in NSF sponsored funding. Here are just a few of the notable new research projects the agency supported in FY22:

- The proliferation of rich and complex data in science, medicine, non-profit organizations and government is fueling the rapid growth of data science as a discipline. Data-driven decisions are becoming increasingly critical for society, defense, commerce and individuals, and the nation's and world's reliance on data-driven decisions will only increase in the next decade. Computer Science professor Wallapak Tavanapong received an award of nearly \$3 million for a five-year research project to establish a graduate training program at Iowa State designed to train students with diverse backgrounds to recognize and mitigate risks to dependable data-driven discovery. Tavanapong's research will focus on: 1) Formal foundations, methodology and tools for a dependable data-driven discovery framework; 2) Methods for mitigating risks from noise in data, limited training data and prediction uncertainty of machine-learning models; and 3) Applications of dependable data-driven discovery for biological and social science data.
- Jean-Philippe Tessonier, Richard C. Seagrave Professor of Chemical and Biological Engineering, received a \$2 million award for a four-year project focused on leveraging next-generation

technologies to elevate the manufacturing flexibility, performance and sustainability of the chemical industry. Tessonier and his team from the Iowa State [Center for Biorenewable Chemicals](#) (CBiRC), will streamline fermentation and electrochemistry in modular reactor systems to produce high-value chemicals from regional carbon sources (biomass, such as corn stover) and wind and/or solar energy sources. The overarching goal is to decarbonize the U.S. chemical industry, evolve the power and chemical industries, advance American leadership in chemical manufacturing, improve rural economies and provide unique outreach and training opportunities for building a biomanufacturing workforce

- There's little doubt that computer science (CS) education and an understanding of computational thinking (CT) are critical to students' future success. If the goal is to engage students – and particularly underrepresented students, like girls – in CS and CT, this process must begin in early elementary years, kindergarten through second grade. Literacy is a strong push at the K-2 levels and would seem to be a prime opportunity to integrate CT-related subject matter. In this collaborative project with an award of \$126,308, Kristina Tank, associate professor in the School of Education, will work with researchers at multiple institutions to explore rethinking traditional literacy “circle time” as a venue for incorporating CS/CT learnings. The team will explore multiple types of activities that include plugged and unplugged approaches as well as computational toys to guide high-level instructional practices that support enhanced CT understanding and abilities for all students, including those in traditionally underrepresented populations.

Department of Defense (DOD) research project funding at Iowa State has steadily increased in recent years. The \$9.5 million received in FY22 is second only to the \$9.6 million received in FY18, and up 7.6% from the \$8.8 million received in FY21. Here is an example of one of the notable new research projects that received DOD funding in FY22:

- Sarah Bentil, assistant professor of Mechanical Engineering, received an award of \$796,765 from the DOD Office of Naval Research (ONR) to explore blast-induced traumatic brain injury (bTBI), a leading cause of injury among U.S. Armed Forces service members since 2006. The goal of Bentil's study is two-fold: 1) Develop a standardized method for onsite quantitative detection of the presence of bTBI; and 2) Evaluate the mechanical response of current combat helmet liners exposed to blast waves to help establish future design guidelines for the selection of materials and/or technologies to more effectively mitigate bTBI.

Another notable federally funded FY22 project is an award of \$60,000 that Christina Gish Hill, American Indian Studies professor, received from the National Endowment of the Humanities (NEH). Gish Hill will use these funds for scholarly research for a book project that explores the often-overlooked impact of Native American Agricultural practices in the upper Midwest and Great lakes region. One of those practices – the interplanting of corn, beans and squash known as the [Three Sisters](#) – is gaining more attention and momentum as a means of Native people embracing their heritage and improving their access to healthy, culturally appropriate foods. Gish Hill believes her book will encourage a deeper interest and understanding in Native agricultural foodways and support Native communities' efforts to revitalize these foodways.