# THE SCIENCE COALITION

# THE LIFECYCLE OF A RESEARCH CAREER

Whether a researcher chooses to enter academia, the private sector, or start their own company, funding for federal research agencies — which is decided by Congress on an annual basis — is key to attract, sustain, and maintain a research workforce that advances the boundaries of science while inspiring the next generation to follow in their footsteps. In fact, funding predictability is essential for future researchers to envision STEM as a viable career path.

But where do future scientists get started? The pathway to a career in STEM can begin as early as elementary school and continues to take shape through hands-on undergraduate, graduate, and postdoctoral experiences. Let's take a look at the many ways public-university partnerships play a role in advancing STEM careers and in turn support the more than 560,000-strong research workforce.

Exposure to STEM in elementary, 1 middle, and high school plays an important role in cultivating future researchers and getting students excited about the possibility of a career in STEM. Once enrolled in a college or university, undergraduate research programs allow interested students to gain hands-on experience and explore areas of interest while demonstrating the variety of career opportunities in STEM.

Northern Illinois University's Research Rookies program is a yearlong opportunity tailored to undergraduate

students interested in exploring a topic of research while gaining technical research skills and experience. Students serve as research assistants, establishing a working relationship with a faculty mentor, and participate in professional development workshops.

NIU

Next up - graduate school! In pursuing an advanced degree, future researchers get their first taste of a research career, crafting a compelling research question that will propel their course of study under the guidance of a faculty member. Graduate researchers will develop a proposal for a grant from a federal research agency and use the funding to conduct original research, establishing enduring relationships with federal agency partners that will benefit them throughout their careers.

Potential Pathways

Pathways from 6 univerity research to STEM career include spinoff companies, private sector research, and building an academic career.

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Propelled by support and expertise from federal research agencies, the outcome of a research career - whether it's a groundbreaking discovery, mentoring a new generation of students interested in the

STEM fields, or a spinoff company that underpins a local economy – makes funding from federal agencies an important contribution to the vitality and competitiveness of the American research enterprise.

# UNIVERSITY OF MICHIGAN

The Women in Science and Engineering (WISE) program at the University of Michigan works to increase the participation by women and gender minorities in STEM academic programs and careers. WISE - one of the first university programs in the world of its kind received a Recognition Award for the Integration of Research and Education (RAIRE) from NSF

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## Launch a spinoff company from research:

Universities are a hotbed for innovation, and oftentimes, researchers will use the proprietary insights gained through their work to launch a spinoff company. The Science Coalition's Sparking Economic **Growth** reports chronicle a collective 355 spinoff companies born from federally funded university research, which together have generated billions of dollars in economic impact and support thousands of jobs nationwide.

# W UNIVERSITY of WASHINGTON

Dr. Josh Smith, the co-founder of Jeeva Wireless, a University of Washington spinoff, says NSF

funding was "essential" to initiate the research that now underpins the company's ultra-low power communication technology. Between 2015 and 2019, Jeeva contributed over \$20 million to U.S. GDP and supported more than 100 jobs across the supply chain.

Enter the private sector research workforce: Β. Research experience is critical in the private sector, wherein trained STEM professionals drive advances in industry, contribute to the development of cutting-edge technology, and propel new innovations forward across disciplines.

Exposure to STEM in school

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# Northeastern University

DARTMOUTH After completing his undergraduate degree at Northeastern University, PhD at Dartmouth College, and post-doctoral work at the University of Rochester, Dr. Robert Perni funneled his research expertise into his role as Vice President of Research and Development at IM Therapeutics, a company that develops oral drug molecules for autoimmune conditions. Over the course of his career, he has received grants from NIH and authored or co-authored more than 170 research publications.

Build an academic career: For those C. interested in conducting research in their field of choice for the long-term, academia is a natural fit. Principal investigators conduct their own research, much of which is funded by federal research agencies, instruct undergraduate, graduate, and postdoctoral researchers, and foster an intellectual environment on campus, inspiring the next generation of STEM talent.

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## UNIVERSITY

Dr. Joanna Aizenberg is a pioneer in the fields of biomineralization and

biomimetics and leads the Aizenberg Lab at Harvard University, where dozens of undergraduate and graduate students, post-docs, and research fellows conduct research on bioinspired materials design with support from numerous federal research agencies, including the Department of Defense, DOE, and NSF.

At the end of grad school, graduate 3 researchers publish the results of their work in peer-reviewed publications and, in some cases, apply for patents for their inventions or software. For those interested in gaining further experience in their field of study, some may enter a postdoctoral fellowship.

# **PRINCETON** UNIVERSITY

With funding from the National Institutes of Health (NIH), Zemer Gitai, a Professor in the Department of Molecular Biology at Princeton University, oversees the Gitai Lab, which brings together undergraduate, graduate, and postdoctoral researchers from diverse backgrounds. They are studying how the cell biology of bacteria affects host-pathogen interactions to drive innovations in novel antibiotics.

Federal funding opel research edens, to esearch to es ederal , prope/ research sense up to the se Early career 4 research programs sponsored Early career 1000 by federal research agencies are crucial in easing the transition from graduate researcher to career researcher while strengthening the relationship between researcher and agency.

Innovative discoveries, technological advancements, lifesaving treatments, and more all rely on a robust and sustained research workforce pipeline.

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As researchers' careers progress, federal funding agencies continue to play an important role in propelling researchers forward and sustaining their work.

- NSF's Mid-Career Advancement program "enables a more diverse STEM workforce by facilitating research productivity and creativity from mid-career scientists and engineers."
- NIH's Research Project Grant Program (R01) is intended to "support a discrete, specified, circumscribed project to be performed by the named investigator(s) in an area representing the investigator's specific interest and competencies, based on the mission of the NIH."

#### The National Science Foundation's (NSF) Faculty Early Career Development (CAREER) Program supports "early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization."

- NASA's Early Career Initiative is "focused on professional development for early career scientists, engineers, and technologists."
- The Department of Energy's (DOE) Early Career Research Program "supports the individual research programs of outstanding scientists early in their careers and stimulates research careers in the disciplines supported by the DOE Office of Science."

## CONCLUSION

Universities, federal research agencies, and Congress all play vital roles in increasing diversity in STEM fields to cultivate a robust talent pipeline to protect the legacy and promise of the American scientific enterprise.

When Congress passes robust and reliable annual appropriations for federal research agencies, it is an investment in economic growth, our country's global competitiveness, and the people who put the U.S. at the cutting edge (and keep us there).