Michele Costantino, PhD

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physics
bio chemistry
technology

Publications

Interfacing bacterial microcompartment shell proteins with genetically encoded condensates

Costantino M, Young EJ, Banerjee A, Kerfeld CA, Ghirlanda G. *Protein Science*. **2025**; 34(3):e70061.

Improved radical conjugation of tyrosine and ABTS in disordered proteins

In progress, 2026

Non-Traditional Biochemistry: Disordered Proteins and Educational Pathways

Graduate Thesis, 2024; In-progress for publication, 2027

Education

Arizona State University
PhD in Biochemistry » 2024
Tempe, AZ
Advisor » Giovanna Ghirlanda

Indiana University
BS in Biochemistry » 2018
South Bend, IN
Advisor » Shahir Rizk

BA in Graphic Design » 2004
Bloomington, IN

Presentations

Protein Society Annual Meeting and the **American Peptide Society Annual Meeting**

Functionalization of shell proteins with disordered regions promotes membrane formation around condensates

M. Costantino, E. Young, C. Kerfeld, G. Ghirlanda

Poster » 2023

Biophysical Society Annual Meeting

Liquid-Liquid Phase Separation of Intrinsically Disordered Proteins for Development of Membraneless Organelles in Synthetic Cells

M. Costantino, P. Sharma, S. M. Vaiana, G. Ghirlanda

Poster & Flash Talk » 2020

Awards

Louis B. Perry Summer Research Award

Efficiency improvement of the polymerase chain reaction through liquid-liquid phase separation of disordered proteins » 2025

Awarded for summer undergraduate research with an international student as a visiting professor.

Barry Goldwater Scholarship

Reversible self-assembly of bacteriophage via conformationally selective antibodies » 2017

Received an honorable mention for work in reversible self-assembly with bacteriophage and antibodies.

The Bender Scholarship

This award is for academic merit as a distinguished multidisciplinary student at Indiana University South Bend. I received this award for my work in both biochemistry and art. » 2017

Non-Academic Employment

Freelance Graphic Designer » 2012-2015

I started business to provide high level graphic design to local businesses. I expanded into the wedding industry, designing custom invitations and supporting materials.

Senior Designer » 2005-2012

At Site Enhancement Services, I worked my way up from a summer intern to the head of the art department. As we expanded, I built and led a team dispersed across three states to better meet our national projects. I was a project manager of large scale endeavors of up to thousands of locations, delivering work that was held to higher standards than our competitors and delivered in record times. I developed custom branding for Nike and Fidelity Investments.

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Research

Disordered Proteins in the Origins of Life

Roger Williams University » 2026-present » Costantino Lab

Research has begun on identifying the role of IDPs in origins of life. We are seeking to connect these proteins and their ability to do LLPS to ancient peptides that may have made life possible before membranes existed.

Affects of Phase-Separation on Dyes and Stains

Whitman College » 2025-present » Costantino Lab

Observed partitioning and fluorescence of nucleic acid dyes and stains within coacervates is studied in relation to both the physics driving this phenomenon and the affects in may have on research in the field. Should the stains show preference for these systems and fluorescence without the presence of nucleic acids, it creates concern about microscopy that may include LLPS. Research is currently being carried out with undergraduate student researchers.

Identification of Phase-Separation in Pollen Spore LLR Proteins

Whitman College » 2025-present » Costantino/Vernon Labs

The Vernon Lab studies PIRL proteins, leucine-rich repeat proteins that have disordered regions are both termini. This collaboration seeks to express and study these novel proteins to determine if the disorder provides function. The termini contain a high percentage of charged residues and are proline-rich, suggesting an ability to possibly phase separate. This research is being carried out jointly by an undergraduate student in the Vernon lab.

Interfacial Shell Proteins with Coacervates

Arizona State University » 2023-2025 » Ghirlanda Lab

Microcompartment shell proteins were modified with truncated disordered domains of LAF-1 to facilitate coating of coacervates. Sequences of the truncations played a large role in coating. The coatings were shown to be affected by pH and shell protein concentration. This work has been published and is in the process of being patented.

Radical Conjugation of Tyrosines in Disordered Proteins

Arizona State University » 2022-2025 » Ghirlanda Lab

Reactions with HRP and the substrate ABTS have shown a unique conjugation with tyrosine residues resulting in a purple protein. While previous work has shown this reaction modifies a few tyrosines, we have observed conjugation of all tyrosine residues in a disordered protein. This is currently being explored as an efficient way to label proteins without the need for accessible cysteine or lysine residues. A portion of this work is being collaborated with an undergraduate student.

Non-Traditional Students in STEM Careers

Arizona State University » 2022-2025 » Ghirlanda Lab

Academia is seeing a shift in enrollment and student populations. Non-traditional students are increasing in the classroom but not in STEM majors. This work explores the reasons behind the exclusion of these students and ways to increase their enrollment in the coming years.

Reversible Assembly with MBP and Phage Display

Indiana University » 2017-2018 » Rizk Lab

Using filamentous phage, we intended to design a system that would assemble in response to its environment. Previously designed antibody fragments which bind to specific confirmations of maltose binding protein (MBP) were expressed on one end of the phage with MBP expressed on the other. The system was designed to form assembled filaments in the presence of maltose and disassemble upon removal.

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Teaching Experience

Roger Williams University

Assistant Professor of Biochemistry » 2026-present
Department of Chemistry

Courses Taught: CHEM.390 Biochemistry I Lecture and Lab (Fall 2026), CHEM.190 Principles of Chemistry I Lecture (Fall 2026)

» As the new biochemistry professor in the department, I am responsible for both the biochem lecture and labs, spanning both semesters. This fall, I have updated the syllabus to include 3-D protein modeling and disordered proteins, both growing fields in biochemistry.

» Labs are being updated to be more collaborative as a class, teaching students how to work with others in their field. Emphasis is being placed on professional scientific writing and design principles for figure making. In the spring, lab will focus on current research, teaching students how to develop research and come to terms with failure.

» The fall of 2026 is my first time teaching general chemistry and I am currently developing slides and in-class activities to make lecture more interactive. My goal for the following year is to make the course a flipped classroom.

» Roger Williams offers a master's degree in biotechnology which the univeristy has expressed interest in my participation. This first year will include an assessment of their program and ways to include curriculum from 936-Technologies.

Whitman College

Visiting Assistant Professor of Biochemistry » 2024-2026
Department of Biochemistry, Biophysics and Molecular Biology (BBMB)

Courses Taught: Biochemistry Lecture and Lab, Seminar on Disordered Proteins with Lab (300-level)

» I designed a lecture and lab to teach about disordered proteins, phase separation, and neurodegenerative disorders. The course combines education in biophysics, biochemistry, and neurobiology, with a brief detour into the origins of life. Work includes syllabus development, lecture materials, experimental design, lab protocol development, and interactive class work. Students learn to visually communicate science through the design of infographics used as an art installation at the end of the semester. Lab assignments work to improve scientific writing skills through a review and revise process.

» I updated lecture materials to include new research articles, a basic introduction to drug design and medicinal chemistry, and reassessing teaching order of metabolic pathways. The course includes more case study assignments at the request of past students to aid those going to medical school. To improve investment and career success, I added badges for students to earn based on principles of gamification.

Ivy Tech Community College

Adjunct Faculty » 2012-2015
Visual Communications Degree Program

Courses Taught: Introduction to Computer Graphics, Typography, Advanced Graphic Design

» Courses in introductory design were my first introduction to teaching freshman, giving me perspective on the expectations for incoming students to higher education. Typography, and advanced graphic design for graduating students allowed me to prepare students for their careers and build their portfolios.

» I worked with many non-traditional students who sought higher education after working and starting a family. This was rewarding as a fellow non-traditional student and led me to writing my thesis chapter on teaching in STEM.

» During my time, I updated projects to include new technology in each course. With the world moving more into online and digital sources, materials were shifted to provide students with portfolio pieces designed to improve their job prospects.

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Skills

Scientific

Protein Expression & Purification
PCR & Mutagenesis
Enzyme Kinetics
Bioconjugation
Dynamic Light Scattering
Confocal Microscopy
Fluorescent Labeling
Phase Separation Techniques
PyMol & R
Mass Spectrometry (MALDI)
High-Performance Liquid Chromatography

Professional & Academic

Project Management
Microsoft Office
Adobe Creative Suite
Collaborative Learning
Flipped Classrooms
Teaching as Research

Professional Training

QPR Certification » 2025

Certified in the Suicide Prevention Gatekeeper Program through the QPR Institute. Trained to identify warning signs and intervene in cases of possible self-harm in students and my peers.

CIRTL Associate » 2023

Completed certification at ASU to develop skills in STEM education. Well versed in the concepts of teaching as research and evidence-based teaching. cirtl.net

Business Management » 2011

Completed certification in the Supervisory Development Program through the Mendoza College of Business at the University of Notre Dame. Provided training for management, including the priorities of a manager and the motivations of your employees.

Advising & Service

936-Technologies Board of Directors » 2025-present

I serve on the Board of Directors as the Director of Education for the non-profit company 936-Technologies. Working closely with Dr. Eric Young, this company is focused on educating students in the fast growing biotechnology industry. This includes building kits for home use or K-12 classrooms, designing curriculum for high school and undergraduate courses, and consulting with educational institutions and museums for hands-on learning experiences.

Senior Thesis Advising » 2024-present

Whitman College requires all seniors to engage in research either on campus or another institution/company and show scientific literacy through a written thesis. In the 2024-2025 year, I advised three seniors in biology and the BBMB program on thesis writing and design of scientific figures. This year I will be advising five graduating seniors. I guide students through the differences between thesis writing and a lab report. We discuss industry standards and I provide resources to assist in the thesis process.

Community Outreach » 2025

At Whitman college, I am participating in community outreach for bringing science to local elementary and middle schools. I set up agar petri dishes for children to see what bacteria grow on their hands. They are also able to view grown dishes of bacteria from door handles, elevator buttons, etc. under a microscope. This is the only set up for children to experience science at a micro level at these events.

Oral Exam Committee » 2024-present

Seniors at Whitman College must also pass an oral examination in which they are questioned by faculty in their department on topics specific to their major. In the 2024-25 school year, I participated in multiple exams, testing students with a variety of career goals. I will be carrying out exams this Fall and Spring again.

Alumni Outreach » 2024

Arizona State University reached out to me for an interview about career paths. The School of Molecular Sciences graduate students have been developing materials for incoming and current graduate students. They interviewed alumni for a podcast which aired in February 2025. Most graduate students choose to go into industry and those that do choose academia usually choose to go to an R1 research institution. I discussed my career as an educator at a primarily undergraduate institution and how I chose Whitman College over other offers.

School of Molecular Sciences Graduate Student Council » 2020-2022

As a founding member during the pandemic, I served as the Director of Professional Development. I implemented the Lab at a Glance initiative to help incoming students find labs that fit their research needs with regularly updated information about the research at ASU. I have also advocated for updating the current graduate program to include education on professional development for both industry and academic careers which has led to changes in graduate coursework.