

Ian D. Beatty

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Computational physicist and biosecurity researcher using AI, machine learning, data science, computational modeling, and creative problem-solving to develop safeguards against AI-enabled biological threats and catastrophic pandemics.

Professional Experience

Research Affiliate, Fourth Eon Bio

Jan 2026 – present

- As a **research fellow** in the ERA AIxBio Research Fellowship winter 2026 cohort, I developed and evaluated novel, computationally efficient methods for DNA synthesis screening using information compression models, machine learning classifiers, and convolutional neural networks.
- As a **research collaborator**, I'm continuing technical research on DNA synthesis screening methods.

Department of Physics & Astronomy, U. of North Carolina Greensboro

Jan 2009 – present

Associate Professor w/Tenure, Aug 2015 – present

- As a **consultant to a robotics start-up**, I conducted computational fluid dynamics investigations.
- As a **computational physics instructor**, I taught students a variety of methods for modeling complex systems, including epidemiological models of pandemic spread.
- As **research group co-director**, I assimilated scientific literature, guided research strategy, and advised on methods. To fund a talented postdoc's project, I helped improve its design and wrote much of the proposal to win a \$300k grant ([NSF DUE-1612053](#)).
- As the group's senior **data analyst**, I learned and applied statistical methods and led the development and validation of research surveys. I communicated ideas and results through journal articles, conference papers, presentations, and posters.
- As **Director of Undergraduate Studies** for Physics & Astronomy, I redesigned a degree program, designed and won approval for a new degree concentration in nanoscience, and created a system to efficiently provide students with more personalized and thorough degree path advising.
- Appointed to UNCG's **General Education Revision Task Force** by the Provost, I contributed heavily to the design of a new requirements system that satisfied stakeholders from across campus having competing views and priorities, and designed its "Data Analysis and Interpretation" requirement.

Assistant Professor, Jan 2009 – Aug 2015

- As a **physics instructor**, I taught 16 different courses spanning topics and levels, drawing on education research results to creatively redesign and iteratively improve every course.
- As a **lab course developer**, I devised introductory physics lab experiments that use off-the-shelf and scrounged parts to teach mechanics, optics, fluids, sound, circuits, and electromagnetism.
- As a recognized **pedagogy expert**, I delivered professional development keynotes, talks, and workshops at UNCG and elsewhere. I proposed, won funding for, and led a \$40k project to help UNCG faculty adopt "technology-mediated active learning."
- As a **peer reviewer**, I critically reviewed submissions to eight different journals and conference proceedings. The South African journal *Education as Change* awarded me "2009 Reviewer of the Year" for my constructive feedback to novice researchers.
- As a **faculty senator** elected to three consecutive three-year terms, I actively participated in faculty governance through Senate deliberations and multiple committees.
- I **supervised and mentored undergraduate teaching assistants** in a program I helped create, guiding 27 students over ten years in teams of 4-6 to design and conduct laboratory classes.

Research Assistant Professor, Feb 2006 – Jan 2009

- As **project manager** for a \$2.5M multi-site research study, I coordinated four faculty, graduate and undergraduate research assistants, consultants, and 38 secondary school teachers.
- As **lead data analyst** for that project, I learned and applied multiple qualitative and quantitative research methods and disseminated scientific knowledge to varied audiences via journal articles, resource briefs, and conference talks and posters.
- As a **teacher educator**, I co-developed and co-conducted workshops for university and secondary-school science and mathematics teachers in the US, South Africa, Uganda, Argentina, and Cyprus.

Senior Postdoctoral Research Associate, Jun 2002 – Feb 2006

- As a **co-principal investigator**, I helped my research group win a \$2.5M grant (NSF TPC-0456124) by restructuring the group's project and proposal to be more compelling and rigorous.

Postdoctoral Research Associate, Jun 2000 – Jun 2002

Graduate Research & Teaching Assistant, Feb 1991 – May 2000

- As a **teaching assistant** assigned to the laboratory sections for introductory physics for physics majors, I completely redesigned the curriculum based on education research principles, and was recognized with the Arthur Quinton Award for Outstanding Teaching Assistant (1995).

Education & Training

Ph.D. in Physics, U. of Massachusetts Amherst, May 2000

- Research area specialization: Physics education. Dissertation: *ConMap: Investigating New Computer-Based Approaches to Assessing Conceptual Knowledge Structure in Physics*.

B.S. in Physics, U. of Massachusetts Amherst, May 1990 (Summa Cum Laude, 4.0 GPA)

- Honors thesis in theoretical nuclear physics: $O_1^+ \rightarrow O_2^+$ Electron Scattering Form-Factors in ^{40}Ca and ^{48}Ca .
- Received *Sigma Xi* Science Award (1989), *Phi Beta Kappa* Key Award (1989), and Hasbrouck Award for Outstanding Physics Major (1989).

Research Internship, Massachusetts Institute of Technology, Summer 1988

- Research area & topic: Materials science & engineering, high-temperature-superconductivity.

Skills & Expertise

Biosecurity: Broad familiarity with the biosecurity landscape, risk elevation by biological AI tools, early warning via metagenomic surveillance. Experience building DNA synthesis screening tools.

Artificial intelligence & machine learning: Fundamentals of deep learning model architectures and training methods, data analysis via machine learning methods, and general AI tools and capabilities. Experience building, training, and evaluating convolutional neural networks with *PyTorch*.

Research: Reviewing & synthesizing literature, designing experiments, managing projects, sourcing equipment, crafting proposals, developing & validating research instruments, collecting & analyzing data (qualitative or quantitative, physical or social), communicating process & results.

Meta: Communicating with diverse audiences in person or writing, building consensus among teammates and stakeholders, producing work to exacting standards under tight deadlines, working independently or collaborating closely with a team, prioritizing competing responsibilities.

Science & technology: Foundational and advanced topics of physics & mathematics, computational modeling methods & tools, laboratory methods & analysis, physics basis of modern technologies, coding languages & tools, climate change impacts, evidence-based pedagogical methods.

International: Professional travel & collaboration in South Africa (~12 visits, including 6-month and 4-month stays), Namibia, Zimbabwe, Uganda, Cyprus, Scotland, Argentina, and Chile.