

## Dr. Kirk: Unlocking Student Potential in the Life Sciences

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Dr. Karen Kirk, beloved professor of Biology and Biochemistry & Molecular Biology at Lake Forest College (LFC), recently received the Foster G. and Mary W. McGaw Professorship in the Life Sciences for her outstanding academic achievements and contributions to the sciences at LFC. This article traces her surprising and relatable academic journey (including what led her to the study of telomeres significant segments of DNA that tell us much about stress and aging), her passion for research, and most importantly, her passion for helping students unleash their creative potential, persevere, and tackle scientific discovery in their own way.

The first people to come to mind when you think of high school dropouts are not college professors. However, Dr. Kirk is an exception to this rule. Unempowered by her high school at age sixteen, Dr. Kirk instead chose to enroll in college to further her intellectual development and get a head start, setting the stage for a long and fruitful career in academia.

She stumbled upon her love for chemistry and biology by accident. Dr. Kirk began college with a major in music because she loved playing piano, but was soon influenced by her brother, who had majored in chemistry and landed a job just after graduating. At the time, "it seemed like a reasonable thing to do," she explained, laughing. It wasn't until she transferred to University of Delaware two years later that she became captivated by the biological component of chemistry.

"I realized that biology was really the fascinating area, because you could do so much with gene splicing, genetic engineering, and other molecular biology tools," Dr. Kirk explained. At the time, discoveries in genetics—coupled with new and powerful research methods—created emerging fields with infinite potential for research. After receiving her undergraduate degree, Dr. Kirk worked in molecular parasitology at Merck Pharmaceutical Company, studying how parasites interact with their livestock hosts at the cellular level. She then received her PhD in Microbiology and Molecular Biology from Rutgers University, and completed her postdoctoral fellowship at UC San Francisco with Dr. Elizabeth Blackburn, who received a Nobel Prize in 2009 for her discovery of telomeres. This experience opened a new world of interest and would inform Dr. Kirk's work over the coming decades. "I loved [studying] telomeres... It gets more interesting all the time, because there appears to be a need to have a long telomere, and it's important for the cell to have the chromosomes capped by a lot of these sequences... I've spent my life being fascinated by these kinds of things. So many, many things about telomeres."

For Dr. Kirk, working with Dr. Blackburn was not just amazing because she was a groundbreaking scientist, but also because she was a woman, which was a rarity in the field at the time. Dr. Kirk highlighted that "now, that's changed, but even still, it hasn't changed that much, because only 6% today of the Nobel Prize winners are women. So, we have a long way to go."

At Lake Forest College, Dr. Kirk has continued the work she started with Dr. Blackburn, researching with LFC students how telomeres (and the enzyme that makes them, telomerase) function in model organisms like the fungus *Aspergillus nidulans*. Telomeres are critical stretches of DNA that protect the ends of chromosomes in most living organisms—including humans—and are indicators of cellular aging. Over the years, Dr. Kirk's lab has received nearly one million dollars in funding from the National Science Foundation, which has granted her and her students access to cutting-edge equipment and research techniques. Impressively, she and her student researchers have published 7 papers on telomeres to date. Recently, in April 2025, the scientific journal PLOS One published Dr.

Kirk's research with eight student co-authors, in which they investigated whether the RNA portion of telomerase (TER) associates with the telomerase protein (TERT) in the cytoplasm or in the nucleus of *A. nidulans*. What they found was striking: TER stays in the nucleus, as it does in vertebrates, and does not travel to the cytoplasm first, as it does in other fungi. Currently, Dr. Kirk and her student researchers are investigating whether telomerase expression is upregulated during meiosis.

During her nearly thirty years at Lake Forest College, beyond research with students, Dr. Kirk has developed and taught many of the core courses in the Biology Department, including Molecules, Genes, and Cells (BIOL 221), From Genotype to Phenotype (BIOL 352), Microbiology (BIOL 323), and more recently, Bio Inquiry: Gene Editing (BIOL 140). Infused in her lectures and lab sections is a motivation to show students that they are capable scientists and to inspire their curiosity. "My favorite thing is to teach labs, and the reason I love to do labs is because I always like to take one problem and have students spend the semester approaching it." In this way, students who are initially technically shy or lack conviction in their research abilities slowly gain motivation and confidence. "I really like for students to learn to gain independence in the lab... I want them to gain that knowledge." For Dr. Kirk, the most rewarding part of teaching is watching students transform from hesitant learners into confident scientists who trust their own ideas.

When asked if the Foster G. and Mary W. McGaw Professorship in the Life Sciences award feels validating of all the work she has done at the college, she smiled widely, humbly answering "Yes, it really does. It's awesome. It is truly awesome." She's eager to highlight the impact that her students have made on the journey. "I can't say enough: this is what I love the most... Thanks to all of the talented Lake Forest College undergraduates who have worked with me."



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