09 September 2025

Dear Committee Members:

I am writing to apply for the Herbert Reich Chair of Natural Science at Deep Springs College. The Deep Springs environment looks to me like the kind of place that anyone who loves teaching and learning with students in a beautiful natural setting would want to be.

The mission of Deep Springs is to prepare students for a life of service through academic study, self-governance, and manual labor. This approach resonates with me, in part because several years ago I lived and worked year-round at YMCA camps while teaching environmental education. During this time, I taught outdoor classes to ~12-year-olds from local schools while they stayed at the camp. For the days each school was on site, our small team taught their classes, ate our meals in the same dining hall, and provided their evening entertainment (such as taking kids from Brooklyn on a night hike in the woods with no flashlights). After teaching one group from New York City, I was on a day off in the City and by extreme chance happened by their school at afternoon dismissal. The kids recognized us, told their teachers, and we were invited into the school building as guests. It was incredible to hear the kids remember their outdoor education experience, see the excitement in their faces, and have the teachers recognize the impact of their trip. I loved my time teaching outdoor education, because of the tight community, the frequent time outside, and the impact we made on students.

Deep Springs academics focuses on small-group experiences and student creation of learning. My qualifications for the position come from 22 years of teaching college biology, including running a productive, undergraduate-centered research lab. In 2023 I was awarded the Distinguished Professor award at the University of North Florida (UNF), the highest campus award for career-long success in teaching, scholarship, and service, with only one awarded each year.

I have taught about five courses per year at UNF. These courses have included Human Physiology, Animal Physiology, General Zoology, and labs for all three of these. My favorite courses depend less on the course content and more on the activities in the course and the opportunities created for interaction with students. I have incorporated seminar-style discussions (usually of primary papers) into several of my lecture courses. Better, I have converted labs for these courses into Course-based Undergraduate Research Experiences (CUREs). Students learn how to run a standard experiment, develop a prospectus on their own projects within this system, then run their experiment, and finally report on it. This approach gives students more opportunities for active and creative learning. And a bonus for me is that they are more fun to teach.

My favorite part of my job at UNF has always been conducting research with students, which involves mentoring individuals and small groups. A key part of training students in research is guiding them through both oral and written presentations. UNF Biology’s capstone course is Senior Seminar, which involves writing a 10-page paper and giving a 12-minute talk. I mentor all my research students for Senior Seminar, as well as about five non-lab students writing review papers per year. In my research lab, my goal is that every student who works in the lab for a year presents a poster on campus. Most years, we have one or two students present a poster at a national conference. Further, many of my undergraduate students, and all of my MS students, have published their work in peer-reviewed journals, and these are all guided and co-authored by me. I have lots of experience in teaching scientific speaking and writing.

My research is on how animals adjust to the environment to alter their life-history (e.g., age at reproduction, lifespan). Within this broad framework lies the biology of aging, which seeks to understand how older animals fail to maintain and repair their bodies, and how that might be improved by lifestyle or pharmaceutical approaches. The overall goal of the field is to identify treatments that can slow aging in people, delaying the onset of all age-related diseases and serving as the ultimate preventative medicine.

Focusing on the effects of diet on longevity using grasshoppers as a model system, I have had three sole-authored National Institute on Aging R15 awards (i.e., Academic Research Enhancement Awards). These grants are reserved for Primarily Undergraduate Institutions, and they require as equal goals both excellent science and student involvement in that science. In the past 10 years, my research students have gone on to graduate programs in science (8), MD or DO programs (11), other health-related careers (9), teaching (5), and industry (3).

The self-governance pillar of Deep Springs emphasizes the key role that students play in the operation of the College. Involving students in decision making is also part of my research program. Each spring, returning students get the opportunity to develop a summer project, by reading the literature and discussing possibilities with me. Similarly, in our Course-based Undergraduate Research Experiences (CUREs), student groups are required to take the initiative and develop their own experimental design. In these ways, I have guided students through crafting their own trajectory.

The labor pillar of Deep Springs illustrates the importance of being willing to break a sweat to contribute to society, which I firmly believe in. First, I have commuted to work by bicycle for 30 years, most of that in one of the least bicycle-friendly cities in the US. Second, while I’m not great at it, I enjoy raising fruits in my yard, including mulberries, plums, and citrus. And last but not least, running a research lab focused on animal lifespan absolutely requires some manual lab to keep things clean and avoid diseases. I make a point of contributing to the ‘dirty jobs’ in the lab to show my students I understand and support their efforts.

Briefly, two topics I would suggest to co-teach with humanities faculty are Theory of Mind, and Lysenkoism and anti-science movements: past and present. In the first class, the scientific portion would focus on when in the evolution of primates animals evolved the ability to understand that others have private thoughts, and when this ability arises developmentally in humans. I have read two books of primary research on this topic, and with my background in animal behavior from my PhD era, I can evaluate the scientific approaches to testing Theory of Mind. The second course would discuss the history of denying genetics in the agricultural programs of the USSR and the resulting famines, and how this is paralleled by the anti-science vaccine denial becoming prominent in the US today.

Based on my experiences, three courses that I would love to teach at Deep Springs are: Biology of Aging, Research experience in plasticity of insect development, and Exercise as the polypill.

**Biology of Aging seminar**: The central goal of health care is more healthy years lived. Most biomedical research focuses on specific diseases, and most of these typically occur late in life. Curing one age-related disease, for example kidney disease, results in a young kidney in an otherwise old body. The ultimate preventative medicine would be to slow the aging process and delay the onset of all age-related diseases simultaneously. Modeling shows that delaying human aging, to the same degree as can now readily be achieved in laboratory mice, would increase life expectancy more than curing all cancers. This course will focus on reading and discussing primary papers on the mechanisms underlying aging, and how to delay it. Papers will be selected by the students, with the requirement that we select a few themes and stick to each theme for several weeks at a time, to allow the students to build a body of knowledge on the topic. Possible themes include: life-extension by rapamycin; the role of insulin-like growth factors; senescent cells and senolytic drugs; the cell cycle and telomeres; dietary protein:carbohydrate balance; mitochondrial activity; anti-oxidants; heat shock proteins (aka., chaperonins). As a bridge to the primary papers, students will be assigned specific topics to research and then explain to their peers (e.g., how biomolecular damage occurs; how anti-oxidants reduce biomolecular damage). Last, we will discuss (at least) one challenge of implementation of clinical anti-aging treatments: the Food and Drug Administration does not consider aging a disease, so drugs cannot be prescribed to slow aging.

**Research experience in plasticity of insect development**: This course will provide students the opportunity to learn about an area of current biological research, design their own experiment, implement the experiment, and report on the project (i.e., a CURE). Developmental plasticity is the ability of animals to adjust to environmental conditions and alter life-history tactics such as age at adulthood, size at adulthood, age at initiation of reproduction, or offspring size and number. For example, tadpoles of desert toads respond to shallow water by accelerating development, so they can become a small adult toad and escape the drying pond. This ability to adjust to environmental change is crucial to a species’ ability to thrive in different weather or different seasons. Many responses to environmental stress have common molecular responses. For example, many stressors stimulate production of Heat Shock Proteins, a class of cellular molecules that help proteins hold the correct shape, or tag severely damage proteins for recycling. In turn, these stressors affect many life-history tactics (e.g., age at adulthood). Students will read and discuss primary papers on the effects of Heat Shock Proteins on insect development, simultaneously master mRNA quantification for their projects, design their own projects, present their project design to the class for critique, carry out the experiment, analyze samples for mRNA expression, and report their results at an end-of-class seminar session. By addressing the effects of Heat Shock Proteins on insect development, this allows each student to select the stressor to use in their experiment. All students will measure the expression of Heat Shock Protein-70 RNA, and each student to select the life-history response for their experiment. This approach allows flexibility in experimental design by the students but also makes incorporating measurement of a molecular response feasible.

A diagram of a heat shock protein

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**Exercise as the polypill**: Much contemporary biomedical research searches for ways to keep people healthy without eating right or exercising. Indeed, adherence to healthy diets and exercise programs are very low, but practicing these two habits has tremendous health benefits. In this class, we will discuss the multifaceted benefits of regular physical activity (such as the manual labor incorporated as part of the Deep Springs experience). We will read and discuss primary papers on the benefits of exercise, maintaining themes (e.g., blood sugar regulation, prevention of cancer, mental health benefits) throughout the course. In addition, we will discuss the evolutionary origins of humans as physically active, resulting in a species that is healthiest when active, and the reasons for our sedentary contemporary lifestyles that are detrimental to our health.

Thanks for your interest in my application.

Sincerely,

A computer screen shot of a signature

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