Cool New Course: Investigations in Neurodegeneration

Michelle Soriano
Lake Forest College
Lake Forest, Illinois 60045

Lake Forest College students now have the chance to enroll in an innovative new course, *Experimental Investigations in Neurodegeneration*, offered by the newest addition to the Neuroscience Department and its future Chair, Dr. Blaine Moore. He has published several articles on his research on Alzheimer's disease as well as articles that focus on creating undergraduate programs that will enhance student outcomes while learning bioinformatics. Dr. Moore explained his inspiration for creating the course: "My hope is students will benefit from novel laboratory investigations in a neurodegenerative disease context." This course is designed to help students gain hands-on research experience while learning more about Alzheimer's disease mechanisms, making this elective perfect for preparing students for future careers in research.

Students taking the course learn the lab skills necessary to study the molecular and biochemical contributions of amyloid beta, tau proteins, and microglial cells to Alzheimer's disease pathology. Dr. Moore explained, "I wanted to design a course that combines a deep dive on Alzheimer's disease mechanisms with a cell culture-based experimental model." In the lab, students work with the CHO 695 cell line, a mammalian cell culture system. This cell line, derived from Chinese hamster ovary cells, has been engineered to express the human version of amyloid precursor protein (APP) called APP69. The students' goal is to manipulate the protein pathways of APP that become pathogenic when amyloid beta secretions accumulate in the brain. Dr. Moore has used this cell culture system extensively in his own research and chose this model system for the course due to its reliability and utility when studying APP proteolysis.

Students use this cell line to design and conduct their own novel experiments, requiring significant monitoring. This time commitment earns students experiential learning (EL) credits for the semester. Dr. Moore explained that the course satisfies the EL requirement because students are expected to "maintain their cell cultures and move their experiments forward in a way that mimics what they would encounter in a research internship." This time commitment gives students a taste of what it would be like to conduct real-world research while fulfilling an important graduation requirement. As students manage their own experiments, they learn how to maintain cell cultures, use bioinformatics for sequencing analysis, interpret findings, and write results in a final manuscript. In addition to their experiment, students attend regular class lectures and guest speaker research seminars as well as presenting journal clubs on current scientific literature. This kind of experience is invaluable for students interested in graduate school or pursuing careers in research.

Students can also expect to develop confidence in their ability to troubleshoot problems and find solutions to move their research forward. Dr. Moore encourages his students to adopt a growth mindset that embraces the learning process and all the mistakes that come with it. By pushing his students to lean into their curiosity with tenacity, he allows his students to engage with the material on a deeper level rather than focusing on what grade they may receive. When asked to describe her experience with the course, Perla Arias, a senior and neuroscience major at Lake Forest College, commented, "I love it; this is the most I have ever understood in a science class." Arias, who has conducted research for two years on Alzheimer's disease, explained that she gained so much from the course because he made these complex topics less daunting. "[Dr. Moore] does an amazing job of putting ideas together to approach a research question," Arias explained when asked about his teaching style. This course promises to have a lasting impact, both on the students who take it and on the future of neurodegenerative disease research at Lake Forest College.

As the college welcomes Dr. Moore and his fun new course, students interested in taking the course can look forward to enjoying the rigorous material. *Experimental Investigations in Neurodegeneration* is an exciting first step for students to join the ranks of cutting-edge neuroscientists focused on finding innovative treatments for Alzheimer's disease. The course is not exclusive to neuroscience majors, however, with the only prerequisite course being BIOL 221, making this an excellent opportunity for other majors to learn more about neurodegenerative diseases.