Integration and Inspiration: A Spartan’s Take on Physiology

The fall of 2012 saw an academic transition in my life that would ultimately have a profound impact on my professional goals and aspirations. After years of tedious preparation and youthful impatience, my college career had finally begun at Michigan State University. Relying on my previous interests in public health, medicine, and the natural sciences, I chose to join the incoming class of freshman Spartan students at Lyman Briggs College, a residential college within the university offering 38 majors specializing in science and mathematics. It was at this crucial point, however, I experienced a phenomenon that many other students could sympathize with: I had no idea which major to choose. Although I could use my first 2 years of study to explore the different scientific disciplines, I chose to rely on my existing interests and academic instinct. To successfully prepare myself for a future in public health and medicine, it was paramount that I garner a broad and detailed knowledge base of the human body, with a focus on integration and function of individual body systems. Hopefully, cultivating an innate ability to understand the systemic functions of the human body would improve my ability to study and prevent disease. That moment of realization was all it took to declare a major in Physiology, although I had no idea of the world-class education that would come as a result (4).

For dedicated Spartans, the undergraduate Physiology program at Michigan State University begins with two full semesters each of chemistry, biology, and physics. For each subject, laboratory courses are coupled with the lectures to build on the basic concepts, while introducing students to laboratory safety, protocol, and practice. Early on, students who are pursuing physiology must prepare for the intrinsic rigor of these subjects, especially within Lyman Briggs College and the College of Natural Sciences. These complementary courses, lecture and laboratory, would ultimately provide the foundation for academic success in the core curriculum of physiology and anatomy that awaits each student at the beginning of their third year of study. For most students who have chosen this path, such a timeline of coursework is quite typical, as well as demanding, yet undoubtedly worth the wait.

The third year marks the long-anticipated beginning of specialized physiological coursework. After four consecutive semesters of grueling classes, late-night studying, and laboratory experiments, the basic sciences give way to an in-depth introduction to systemic physiology, advanced biochemistry, and anatomy. The core curriculum of physiology and biochemistry, each spanning two semesters, gives students the answers to the questions of Why? and How? A full year of fundamental physiology outlines the function of each individual body system, as well as the basics of cellular signaling and electrochemical gradients. Usually taken simultaneously with physiology, a full term of advanced biochemistry outlines the basics of cellular signaling, enzyme kinetics, and protein formation. Human anatomy, on the other hand, gives students the answers to the questions Where? and What? Taken for one semester, human anatomy provides the names, locations, and relationships between every body part, inside and out. The quality and depth of the lecture material for human physiology, advanced biochemistry, and human anatomy requires a great deal of attention and dedication outside of class. However, a successful year of study in core physiology curriculum ensures that students are prepared for the increased rigor of the following year of coursework.

Upon the arrival of the final year of study in the undergraduate Physiology program at Michigan State, the focus turns toward the integration of individual body systems, as well as the development and application of employable skills. Several required upper-level courses are essential to accomplishing these goals. “Health and Disease in Society” is taught from a more research-oriented point of view, exposing students to the variety of possibilities in physiological research. Each lecture unit within the class is taught by a different professor with unique ideas and perspectives to discuss. Specifically, I was able to bridge the gap between the physiological research and real-world applications of epilepsy, cancer, and macular degeneration. However, I prepared for both individual classes and exams by analyzing peer-reviewed scientific articles related to the subject matter at hand. As a result, I became extremely proficient at extracting and synthesizing information contained within scientific journals, a skill that is absolutely essential to a career in the sciences.

“Physiological Biophysics” was also required during my final year of study. The class, as made evident by its name, focuses on the physical mechanisms behind many of the topics previously introduced in the core curriculum of physiology. As we dove deeper into the questions of How? and Why? I began to comprehend the physical origins of systemic function and integration within the body, as well as disease. Specifically, the mechanisms behind mutation, autoimmune diseases, and sense regulation were personally captivating. The class finished with an individual presentation on a biophysical research paper, aimed at improving public speaking and analytical skills.

Although my final year as an undergraduate Physiology major brought rigorous courses required for graduation, I was also given room to explore the sub-disciplines of physiology that were more individually appealing. I was required to enroll in upper-level topics courses, which are smaller classes designed to magnify a specific field within physiology. Exercise physiology and cellular respiration are popular with many students, but I chose to take a closer look at stem cell biology and environmental physiology. The first focused on the current state of stem cell research, and consisted of analyzing and presenting peer-reviewed studies involving stem cells, which vastly improved my public
speaking and presentation skills. The latter class discussed the impact of different environments, such as high elevation and microgravity, on the physiology of different body systems, with special emphasis on integrative physiology. In general, the special topics courses at Michigan State cultivated an intimate atmosphere, conducive to healthy discussion and public speaking. Personally, I believe that my interest and passion for physiology was confirmed, without a doubt, within the special topics courses of my undergraduate program.

Finally, as required by the Physiology program at Michigan State, I had to complete a capstone course before obtaining my degree. For my peers and me, we had arrived at the “Capstone Lab in Physiology,” regarded as the final course before being released into the welcoming arms of the real world. From what I had heard before, this was exactly the time and place where physiology came into practice. For me, it served as the class where I truly connected with my studies in physiology. This is consistent with a study conducted at Århus University, which found that students enrolled in a laboratory course felt more confident and interested in difficult physiological concepts once given firsthand experience in a laboratory setting (1). The class was designed to give undergraduates a “hands-on” approach to body systems integration and the application of physiological research in the real world (2). Accomplished through weekly experiments and a final capstone project, the class imparts on students an idea of how to conduct and publish physiological research via grant proposals, subject testing, and a poster presentation (3). Essentially, the capstone lab allows students to explore and expand on their personal motivations as to why they chose to study physiology at Michigan State.

At Michigan State, the Physiology program absolutely ensures that its students depart their undergraduate careers with the employable skills and immense knowledge base necessary to succeed in scientific research, medical practice, or any other line of work. My ability to condense, synthesize, and relate scientific literature to the world beyond the scientific community vastly improved. I firmly believe that my enhanced professional communication and project development skills came as a direct result of the coursework required by the Physiology program. The welcoming environment cultivated by the enthusiastic professors and teaching assistants allows for this type of personal growth to occur, which I regard as a key to my academic success in the program. A majority of the core curriculum and upper-level courses are team-taught, with each professor offering a unique perspective and style of teaching. As a student, this reflected the broad number of interests and paths one can have within the field, as well as the global applications of physiology. Outside of the classroom, teaching assistants help students garner confidence in the subject matter, as well as aid with project development and exam preparation. Through their supportive demeanor and passion, physiology undergraduates are prepared to fully succeed in the field, and the world beyond.

With the culmination of my undergraduate career, I can say without a doubt that the physiology program at Michigan State University changed my life. My studies gave me the broad physiological knowledge base necessary for success in medicine and public health, especially regarding disease transmission and integrative body function. As an academic side effect, I gained the skills and abilities necessary to develop from an undergraduate student into an employable professional. However, most importantly, I will have gained an immense network of mentors, peers, and close friends who are as passionate as I am about physiology and human health. To them, I can only express gratitude for cultivating and maintaining a world-class physiology program. Reflecting on my collegiate experience, I am confident that my academic and professional development are a direct result of selecting physiology as my undergraduate major.

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References


