

Nelson Glover
E-mail: glover.262@buckeyemail.osu.edu

PhD. Candidate
Tel: 301-741-2256

To whom it may concern,

I am writing to express my concern in the Black Trailblazers in Engineering workshop, because I believe it can help shape how I view what I can accomplish as a faculty member. As a student near the end of my PhD process, my attention has shifted to try and understand more of what it means to be a faculty member and what my role could be in an engineering department. This program will help me connect with other scientists who have been in the same position as me and learn from their perspectives to help further inform mine. Being able to hear from the funding program managers will help me plan on how to phrase and structure my future research in a way that will be better funded and subsequently be more effective. Additionally, I am very eager to hear from the Keynote speakers and panelists on how they got to where they are, and what advice they may have for the modern PhD graduate.

The BTE workshop is perfect for me because it means a lot to me being a black engineer. I was involved in NSBE all throughout my undergraduate career, until I finally became the president in my senior year. Continuing to support and foster black engineers is so important because the further up in academia I went, the less that I saw. When I arrived at Ohio State, I also noticed another decrease in the number of black engineers again, which led some of my peers and I to found the Society of Black Graduate Engineers, of which I am the current president. This group was created to carry out the same mission as NSBE, and to simply create a much-needed community among the black engineers. The next place that I looked was in the ranks of faculty in engineering, which I have always known there are even fewer people who looked like me. I began looking more into how it was that I could become a faculty member, and what kind of impact I could have there.

To become a faculty member, I began working with my advisor on smaller things, such as manuscript reviews and helping with his course by grading assignments and leading lectures. My fourth year in graduate school, I became a Great Lecturer Series Scholar where I spoke to some of our current and Emeritus faculty that have been rated as some of the best professors at OSU and created best practices based on what was most important to them while teaching. Around the same time, I joined the Inclusive Excellence Council of the College of Engineering, where I learned about how policy can change within a college, while also helping shape my own college. In the spring of 2020, I was awarded as a Future Academic Scholars Training Fellow, which gave me the opportunity to serve as the instructor of record for a course. This January, I began teaching Statics as the instructor, which has given me tremendous perspective on how to setup, manage, and structure a course. I have also learned how to manage the two undergraduate TAs and grader that work to help implement the course. In lab I have also taken on more responsibility in mentoring more undergraduate and early graduate students to get a better idea of how it may be to advise students as a research mentor.

I believe that this workshop will help further prepare me for academia and give me more perspective on how I can best make an impact as a black engineering faculty member.

Sincerely,

Nelson Glover

Research and Education Plan

Becoming a faculty member embodies everything that I want to accomplish professionally. Research is a huge part of my life as a graduate student, but the potential benefit that my research could have on the lives and health of many people. As an undergraduate student, my focus was mostly on the technical aspects, but quickly I started to become interested in the intersection of mechanical engineering and health. This mix led me to biomechanics, where I currently work and plan to continue my research as a faculty member.

I enjoy sports, but also realize how important they are in maintaining a healthy lifestyle all over the world. However, understanding how to stay injury-free, and in turn healthier, is an area where there is still much work to be done. Physical therapy is a great tool in helping recovering people and people with deficits return to the healthy lifestyle that they want; however, I am hoping to help people before they need to go to physical therapy. By quantifying the forces and moments propagated throughout each joint in the body, we can understand how the differences in movement changes the likelihood of injury during common motions such as running. This approach includes capturing many people's motions and the forces observed from force plates in the ground or embedded in a treadmill. Through inverse dynamics, we can estimate the net forces at their ankles, knees, hips and lower backs. I believe that this approach can be augmented by understanding the individual muscle forces, which requires computational approaches.

Musculoskeletal modeling is a tool commonly used to estimate these muscle forces, and the muscle forces can be used to more accurately estimate these forces propagated through the body. Assumptions must be made based on a global "objective" to guide our modeling tools to choose how much each muscle contributes to create the observed motion. These objectives are often chosen based on energy efficiency, or the assumption that our bodies will not expend more energy than is necessary to. I believe that our bodies are much more complex, and that in these high-energy motions such as cutting, running, and even weightlifting, stability is a large part of what governs our motion. The stabilization of our joints by the surrounding muscles can add unnecessary loads on our joints, which subsequently lead to injury. My goal as a researcher is to quantify these objectives computationally, and to better understand why injuries happen over time in running and weightlifting, and acutely in cutting. The knowledge of why these injuries occur will allow physical therapists, coaches, and athletic trainers better train their athletes on how to avoid these injuries.

Developing this global objective that accounts for stability does not only entail changing the objective function, but also in developing new optimization and simulation techniques themselves. Recently, the rise of predictive simulations and direct collocation methods have allowed much musculoskeletal modeling to move at a much faster rate. Additionally, there has been a boom in personally owned, low-cost fitness trackers that can double as biomechanics collection tools. The combination of these two things is perfect incubator for real-time complex analyses of people's running motions in real-time. Current biomechanical analysis is restricted to expensive, exclusive labs and experts in these fields. Inertial measurement instruments along with artificial intelligence-based image tracking technologies can allow the knowledge of surface kinematics and muscle function developed in the lab a possibility in the real world. This research goal of mine is to develop and leverage these emerging technologies to make in-depth biomechanical analyses accessible to more people. Advancing the science is very important to me but making the science impactful to more people's lives is equally as important.

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This goal of broad, high impact research was partly driven by my experience teaching. I began teaching as early as middle school when I would tutor students in lower grades in math and science. I continued tutoring throughout high school, and then I would go on to be an undergraduate TA. When I got to graduate school, I was mainly focused on my research but in my experience guest lecturing in courses and mentoring undergraduate and graduate students, I was drawn back to teaching again. This spring semester I was able to begin teaching my own section of Statics, which has been very exciting and daunting at the same time. I was looking forward to a classic, in-person format, but was surprised (like everyone else) when the pandemic hit hard, and I knew I would be teaching online. This was a great surprise because I found that I love making asynchronous, accessible courses.

Engineering is often taught with the concepts and then problems are solved to reinforce the theory, however the emergence of the flipped classroom, distance learning, and other more accessible forms of teaching. My goals when it comes to teaching is to use these forms of teaching to amend current core classes to give students more opportunities to develop their engineering skills. I would also love to create a computational biomechanics course that builds on the numerical methods, dynamics, and mechanics coursework, and can help introduce this topic to students in their undergraduate and graduate studies.

NELSON A. GLOVER

glover.nelson.a@gmail.com

EDUCATION

B.S. University of Maryland, Baltimore County – Mechanical Engineering	3.78 GPA
M.S. The Ohio State University – Mechanical Engineering	3.76 GPA
Ph.D. in Progress, The Ohio State University – Mechanical Engineering	3.76 GPA

MANUSCRIPTS

Nelson A Glover, Runit Kakar, Ajit MW Chaudhari. “Effects of Spinal Coupling and Marker Set on Tracking of Spine Models During Running”. Journal of Biomechanics, Vol. 116. 2020

Nelson Glover, Nihit Tyagi, Jackson Corbisello, Ajit MW Chaudhari. “Changes in Core Stability of Recreational runners following exhaustive runs.” *in preparation*

Joseph A Passfiume, **Nelson A Glover**, Anne R Crececius, Ajit MW Chaudhari. “Real-Time Visual Feedback on Breathing during Treadmill Running to Exhaustion”: *in preparation*

CONFERENCE PRESENTATIONS

Nelson A Glover, Ajit MW Chaudhari. “The Development of a New Pitch Count Technology”
Annual Biomedical Research Conference for Minority Students, San Antonio 2014

Nelson A Glover, Runit Kakar, Ajit MW Chaudhari. “Effects of Spinal Coupling and Marker Set on Tracking of Spine Models During Running” In: Proceedings of the International Society of Biomechanics, Calgary 2019

RELEVANT COURSEWORK

Dynamics and Control of Human and Animal Movement, Musculoskeletal Biomechanics, Biomechanics for Physical Therapists, Injury Biomechanics, Research Methods in Biomechanics, Mechanics and Control of Robots

EXPERIENCE

Instructor - Statics

Jan 2020- Present

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Served as the instructor of record for Statics in the Spring 2021 semester. Created an asynchronous course with pre-recorded lectures and in-person (virtual) class meeting material. Development of course schedule and syllabi, homework, quizzes, practice problems, and exams were all additional responsibilities. Oversaw two undergraduate teaching assistants and a grader.

Great Lecturer Series Scholar

Aug 2019 – Aug 2020

Worked with faculty at Ohio State with a focus on understanding what makes lectures more effective for undergraduate students

Guest Instructor

Has orchestrated lab classes (Quantifying Movement & Muscle Function in Clinical Practice and Research) and Review Sessions (Biomechanics for Physical Therapy)

Teaching Fellow: Mechanics of Materials and Intro to Engineering

Aug 2014 – Dec 2015

Duties include delivery of discussion sections, holding office hours, grading homework, quizzes, and exams, and writing solutions for homework

UMBC Learning Resource Center Tutor

Jan 2014 – Sep 2015

Tutored multiple students in Statics, Calculus I and II, and Intro to Engineering, and Physics I in weekly meetings with groups of one to four students

HONORS & AWARDS

Alumni Grants for Graduate Students Awardee

2020

Future Academic Scholar Training Program Fellow

2020-2021

Dean's Graduate Enrichment Fellowship

2016

Patrick S. Osmer SROP Fellowship

2016

Tau Beta Pi

Inducted 2014

SERVICE

Mentoring

May 2019 – Present

Has been the primary research mentor for two undergraduate students, and has helped foster the research acumen of multiple early graduate students within the lab

Session Chair

Served as the session co-chair for the Energetics of Walking session at the International Society of Biomechanics meeting; Calgary, 2019

Journal Reviewer

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Has aided in the reviewing of journal articles in the Journal of Biomechanics (2019, 2020)

National Biomechanics Day Coordinator

Mar 2018 – Present

Duties included coordinating with local schools to bring students to the OSU campus to expose them to biomechanics through interactive demonstrations. Also coordinating with other Ohio State faculty and students to help engage any interested departments and labs.

Society of Black Graduate Engineers, President

May 2019 – Present

The Society of Black Graduate Engineers was created to provide resources and community for its members. As both president and vice-president, we have been responsible for creating the framework of the organization, along with connecting with members of the university to help grow and foster the organization.

Inclusive Excellence Council Member

Oct 2018 – Aug 2020

This College of Engineering-wide Council was created to promote inclusion and equity across the college. Responsibilities included helping with the development of an inclusive excellence certificate program for faculty and staff.

Society of Black Graduate Engineers, Vice President

Jan 2016 – May 2019

Society of Black Graduate Engineers, Co-Founder

Jan 2016



Dear Review Committee,

I am writing to offer my strongest recommendation for Nelson Glover for participation in the Black Trailblazers in Engineering Workshop. I am the Assistant Dean of Graduate Programs in our College of Engineering and an Assistant Professor of Practice in Biomedical Engineering. I oversee the Office of Graduate Education which is responsible for recruitment and retention of graduate students in the college. Over the years I have mentored dozens of undergraduate and graduate students and postdoctoral scholars. Let me start by saying Nelson is one of the finest students I have ever had the pleasure to recruit and he was one of my first recruits. He is charismatic, works well with others, is a strong researcher, a natural leader and has great presence. I first met Nelson when he was a student in the Summer Research Opportunity Program as a second-year undergraduate student and became reacquainted when he returned as a first-year graduate student in Mechanical Engineering. Once he was settled, he became interested in an idea of creating a group that would serve and create community for the black engineering graduate students. Throughout our discussions with students about the creation of the group, Nelson emerged as a part of the core group who would go on to found the Society of Black Graduate Engineers (SBGE). Nelson went on to be the first vice president of the group, for which I am the faculty advisor. He was a good choice for this leadership position because prior to coming to Ohio State, Nelson had already been in leadership positions in organizations such as NSBE. As he continued at Ohio State, Nelson eventually became the president of SBGE, among his other achievements.

Nelson will make a great addition to this workshop because he is also passionate about mentorship. After coming to Ohio State, Nelson was always eager to give back to the program that introduced him, SROP. During the summer, Nelson was always willing to serve as a mentor to these undergraduate students and share his experience. In addition to sharing his experience, he also helped some of the students with the preparation of their posters for the end of summer symposium. This mentorship has expanded to the students in his lab. He currently mentors two undergraduate students and has been instrumental in the development of three junior graduate students thus far. He has continually supported my office in recruiting other graduate students to the college.

Nelson has also shined in his acts of service in and around the university during his time here. In addition to the mentorship, Nelson has been a part of committees such as the Inclusive Excellence Council, which was created in order to help assess and address issues in diversity, equity, and inclusion throughout the College of Engineering. He has also developed and implemented outreach programs at the University. Through his lab, he is the National Biomechanics Coordinator, where he oversees students from middle and high schools coming into his lab for an immersive experience to what biomechanics is, and to help foster their love and interest in science.

On top of all these things, Nelson has excelled academically. He was awarded multiple university fellowships, as well as earning a place in the Great Lecturer Scholars Program and the Future Academic Scholars Training (FAST) Program, both offered through the Mechanical and Aerospace Engineering Department. Both competitive programs gave Nelson unique experiences, and the FAST program included two semesters of teaching preparation and learning about what it means to be a faculty member. Nelson was then chosen as one of three students within this program to serve as the instructor of a course, where he is currently teaching Statics and overseeing three undergraduate teaching assistants and graders.

Nelson has also been strategically preparing himself for a faculty position in other ways. On two occasions he attended the Southern Region Education Board's Institute on Teaching and Mentoring to obtain valuable mentorship and guidance on preparing for faculty positions.

Based on his well-rounded body of work at Ohio State, and the preparation for being a faculty member, he will make a great addition to the Black Trailblazers in Engineering Workshop and ultimately an amazing faculty member. Feel free to contact me should you have any questions.

Sincerely yours,

A handwritten signature in cursive script that reads "La'Tonia Stiner-Jones". The signature is written in black ink and is positioned below the "Sincerely yours," text.

La'Tonia Stiner-Jones PhD, MBA
Assistant Dean of Graduate Programs,
Assistant Professor of Practice, Department of Biomedical Engineering
College of Engineering, The Ohio State University