



Johnson C. Smith University

Data Science Minor and Sports Analytics Undergraduate Research

Dr. Felesia Stukes, Computer Science & Engineering Department

Overview and History

Johnson C. Smith University (JCSU) is an independent, private, coeducational historically Black college and university (HBCU), located in the Historic West End of Charlotte, NC. JCSU integrates the liberal arts with business, the sciences, and technology education and research in innovative, socially conscious ways. Since 2018, JCSU has cultivated a campus-wide Data Science Initiative to build its education and research capacity.

Education

With funding from the National Science Foundation, Dr. Felesia Stukes, JCSU Assistant Professor of Computer Science, led a data science curriculum development project. Stukes initiated the university's data science education efforts by enhancing two existing analytics courses and then established the groundwork of four new courses for a minor in data science. In just over one year, this NSF-funded project resulted in new data science training for 30 undergraduate students, and provided professional development to ten higher education faculty and 15 high school teachers. In fall 2021, JCSU formally launched its interdisciplinary undergraduate minor in Data Science. The program consists of nine credit hours of data science core requirements and nine credit hours of restricted electives. Students are encouraged to select the nine elective credit hours focused around a thematic interest area in which data science will be applied. The curriculum intentionally promotes active learning through real-world, problem-based learning activities that explore social problems and ethical implications. Students learn the basics of commonly deployed analytical methods and tools including data wrangling, cleaning, sampling, analysis, and visualization.

Research

Dr. Stukes directs The JCSU Social Computing Lab (SCL) within which students can apply their data science skills to address social challenges facing the local and regional community. Dr. Stukes mentors and trains undergraduate students in the SCL to use integrated data to increase capacity for data-informed decision-making and deepen understanding of complex issues. Data Analytics Technology & Athletics (DATA) Bulls is the lab's most recent and currently active research project supported with additional funding from the U.S. Department of Defense. The DATA Bulls project helps meet the demand for data talent by increasing minority participation in computing education and research and improving student and faculty access to quality data. This project enhances institutional capacity through its acquisition of human performance, player tracking and sports team analytics equipment. Faculty and students at JCSU leveraged quality, real-world data from wearable technology to produce active, hands-on participation in one or more of the four stages within the data life cycle including (1) data collection & generation; (2) data storage & management; (3) data analysis & interpretation; and (4) data communication & visualization. Using Fitbit activity trackers, undergraduate students could track, export, and analyze physiological attribute data such as heart rate and intensity. This research has



greatly enhanced the collaborative capabilities between the JCSU Department of Computer Science and Engineering (CSE), the Department of Health and Human Performance (HHP) and the JCSU Golden Bulls, which describes the varsity athletic intercollegiate sports teams.

Sustainability Plan

One component of our sustainability planning includes leveraging partnerships and community support. For example, IBM awarded Johnson C. Smith University \$6 million in assets, including university guest lectures, curriculum content, digital badges, software and faculty training. Data science solutions from IBM empower our research team with the latest advances in artificial intelligence, machine learning and automation to support the full data science lifecycle.

Translating into Societal Impact

Technological advancement must not coincide with the disenfranchisement of those without access, and this work helps to bridge the gap that the emerging data literacy divide has created. The societal impacts of this work include increased interest, preparation, and enrollment in computing education and research among groups traditionally underrepresented. Activities are intentionally designed to emphasize a relationship between data, computing, society, and culture using research-based pedagogical methods to help increase women's participation across various majors. Other impacts have involved student and faculty conference presentations as well as dissemination to industry, K-12 and science, technology, engineering, and mathematics (STEM) professional organizations.