

Capability Statement

Institution: **Johnson C. Smith University** NACIS ID(s): **611310** SIC: **None**
DUNS No: **071057806** Cage Code: **06PV2** Federal EIN No.: **250983069**
Certificates, Registrations, Accreditations: **SACS, CSWE**
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OVERVIEW

Johnson C. Smith University (JCSU), an HBCU located in Charlotte, North Carolina offers a liberal education in conjunction with concentrated studies in specialized fields in preparation for students' advanced studies and specific careers. The University has six market-driven centers, which incorporate interdisciplinary and multidisciplinary research areas include: the Center of Automation and Robotics; the Center of Electronics and Cyber Security; the Center of Bioinformatics and Biotechnology; the Center of Medical Informatics; the Center of Analytics and Big Data; and the Center of Renewable Energy and Sustainability. The lately established 62,000sq feet New Science Center equipped with state-of-the-art smart classrooms and labs houses four of the six market-driven centers.

In addition, JCSU has two centers of studies that drive the research and education efforts: a) the Center of Studies in Minority Health and Family Wellness; and b) the Center of Studies in Metacognitive and Non-Cognitive. The University has strong community relationships and strategic partnerships with businesses, corporations and professional groups. As an active community partner, JCSU serves as a catalyst for building and sustaining assets in the surrounding neighborhoods and throughout the city.

JCSU's special recognitions include:

- Ranked 5th in diversity, 15th among Historically Black Colleges and Universities by U.S. News & World Report (2016); Identified by the Bill & Melinda Gates Foundation as one of 35 high-potential Institutional Partnership Sites committed to graduating more first generation and low-income students of color (2016).
- Named among the top 50 most technologically advanced small colleges by The Best Colleges Online (2015); Member of the Clinton Global Initiative University (2015, 2014, 2013, 2012);

RESEARCH CAPABILITIES:

Computer Science and Engineering/Mathematics: Computer Networking, Cybersecurity, Automatic Control & Robotics (Fuzzy Logic Control), Digital Signal Processing, Computer Software Design, Database & Business Applications, Analytics & Big Data, Medical Informatics, Coastal Resilience, K-12 Math Education.

Chemistry: Biochemistry, Electrochemistry (A wide range of analytical (cyclic voltammetry, stripping analysis, etc.), physical electrochemistry, battery/fuel cell and corrosion research, including electrochemical impedance spectroscopy (EIS)), Nanotechnology (Nanomaterials and Polymeric Materials; Antimicrobial Properties of Cellulose NanoFibers; Silver-cellulose nanocomposites gels and films; In Situ Polymerization of Polypyrrole (PPy)), Waste Water Treatment.

Health Disparities: Breast Cancer Prevention, Preconception, Community Health (obesity, diabetes, cancer, HIV, hepatitis and substance abuse), Sports Health and Performance (management of concussions).

Environmental Science: Environmental Sustainability (water quality, air quality and food issues), Renewable Energy (Solar and Wind Energy), Farming.

Biology: Drug (antibiotic) Resistance, Parasitology, Malaria Mosquito.

Library Information Science: Digital Mapping, Digital Archiving.

FACILITIES:

The Shared Instrumentation Resource Laboratory (SIRL): includes a Cary 630 FTIR spectrophotometer equipped with single bounce diamond ATR optics for identification and molecular structure analysis of samples; a Anasazi FTIR capable of obtaining proton-, carbon- and limited 2D-spectra is available for molecular structure determination; a Cary Eclipse spectrofluorometer with the Biomelt temperature control package; a Varian atomic absorption spectrometer capable of either flame or graphite furnace atomization; a 1220 Infinity Gradient HPLC system equipped

with a photodiode array detector; and a Agilent 7890B Series GC with Agilent 5977A inert MSD (GCMS). The GCMS is equipped with a Thermal Separation Probe and a 7697A Headspace Sampler is available. The SIRL also houses an *Electrochemical Workstation* which allows a wide range of analytical (cyclic voltammetry, stripping analysis, etc.), physical electrochemistry, battery/fuel cell and corrosion research, including electrochemical impedance spectroscopy (EIS.) A spectroelectrochemistry setup and an electrochemical quartz crystal microbalance are also available.

SIRL also has a Thermal Analysis Instrumentation (TAI) suite. TAI instrumentation includes a rheometer for measuring flow properties of materials, a differential scanning calorimetry (DSC) to study glass transition temperatures (T_g) of polymer films and composites, and thermo-oxidative studies via thermo-gravimetric analysis (TGA) to understand polymer thermal stability. Other properties include (not limited to) phase transitions (endothermic and exothermic phenomena), crystallinity, gelation, degree of cure (α), thermal expansion, elastic and loss moduli, and tan delta (δ). Polymers, like other organic molecules can be acquired naturally, or synthesized via addition or condensation methods. They can be tailored to have specific properties that can affect many sectors including aviation, space technologies, medical applications, and a host of consumer and commercial goods.

Cybersecurity lab: For both defensive and offensive lab experiments, which allow students to be exposed to the real world challenges of electronic and cyber security. Includes Console Management Device, Adaptive security appliance, Computer and Software for imaging processing, intrusion detection system, packet sniffer, network simulators, key cracking software, firewall, virus scanning tools, etc.

Automation and Robotics lab: Two Adept high-accuracy robots (Viper s560 and s600 robots) and Adept sAVI Vision systems. Well equipped with electronic test equipment, such as classical PID controls, fuzzy logic controls, and a stock of components for prototype research.

Multidisciplinary Applied Computational Modeling and Simulations (MACMAS) Lab: a high performance computer lab and data processing center, using interactive software package for scientific and engineering computation.

JCSU Makerspace and Entrepreneurship Hub: five 3D printers, twenty-five PC's and MACs for the Programming Lab, two Computers for the iDesign Studio, one CNC Mill, and one Epilog laser cutter. The Makerspace also has a virtual Reality Lab that includes all equipment for students to create video games. It also houses an entrepreneurship research hub where students learn more about entrepreneurship and patents.

Smith Tech-Innovation Center: Design and implement tech-innovation programs that provide students with experiential learning opportunities to develop knowledge, skills, and abilities for working in a high-tech and high-growth entrepreneurship environment.

JCSU Biology Lab: PCR and other lab facilities for cell biology, genetics, and anatomy.

JCSU's Sustainability Village: Consists of two green houses, one organic community garden, an aquaponic system, a composting area, and multiple seating/picnic areas. Sustainability Village hosts various community workshops, annual Community Youth Health Day, and the Growing Healthy Communities Program.

PAST PERFORMANCE (Selected):

a) The Center of Homeland Security (Cybersecurity): Collaborating with Jackson State University and Mecklenburg County GIS service in Charlotte, NC, emergency management related applications were developed by utilizing ARCGIS software. **b) Chemistry related research:** investigated the chemical surface modifications and characterization of novel conductive polymers, which are of interests to the industries of batteries and the research fields of electrodeposition, corrosion and chemical and biological sensing. **c) The Center for Renewable Energy & Sustainability:** integrates research in the areas of food security, water quality and civic engagement, academic coursework, service learning, and experiential education opportunities to enhance student understanding of sustainable development that promotes conservation. **d) In mathematics,** a recently completed project "IMPACT: Improving Mathematic Persistence and Achievement through Community partnerships and Transformative teaching" provided a platform for Charlotte-Mecklenburg School district and the University to develop a comprehensive approach to the college and career-readiness standards with STEM industry professionals. **e) An Informal STEM Learning Model:** Genetics, Genomics, and Adult Latino Immigrants – Collaborating with Wake Forest School of Medicine to engage in data analysis using qualitative software (ATLAS.ti).