

## ***Morgan State University Capabilities***

Morgan State University, founded in 1867, is one of the nation's premier Historically Black Colleges and Universities (HBCUs). It has the unique designation, by legislative statute, as Maryland's Public Urban Research University. Morgan is a Carnegie classified Doctoral University Research Activity (R3). With a diverse student population of around 8,000, the University offers a comprehensive program of studies at the undergraduate and graduate levels.

It confers an average of more than 800 degrees annually in more than 35 fields. At the graduate level, it awards doctoral and master's degrees in several selected fields. Programs awarding the doctorate include Bio-environmental Sciences, Engineering (civil, electrical, industrial and transportation), Business Administration, Industrial and Computation Mathematics, Mathematics Education, Science Education, Higher Education Administration, Community College Leadership, Urban Educational Leadership, English, History, Psychometrics, Public Health, and Social Work.



Morgan State University has made a major commitment to academic excellence, and has invested substantial resources in recent years to enhance its research infrastructure, and stimulate research development in a broad range of disciplines. Led by world-class scientists and technicians working in state-of-the-art facilities, MSU's research capabilities in the sciences are distributed among the following:

### **Biology:**

HIV/AIDS; Bioinformatics  
Neurodevelopment/neurodisorders  
Molecular and developmental genetics  
Environmental toxicology  
Environmental microbiology

### **Chemistry**

Polymerization reactions and microgravity  
Analytical sensors for monitoring pollutants and biological activity  
Synthesis of fluorescent dyes and conductive polypropylene polymers for biosensors  
Development of near infrared dyes for use in biological sensors  
Development of inorganic compounds for use in cancer treatment  
Computer modeling; Bioinformatics

### **Computer Science**

Artificial intelligence; Computer modeling  
Computer engineering; Bioinformatics  
Computational sciences, Information Assurance

### **Mathematics**

Nonlinear functional analysis  
Free boundary problems in fluid mechanics  
Almost automorphy and almost periodicity

Image processing and digital signal and applications to biology and medicine,  
Mathematical modeling

**Physics**

Nanotechnology and its applications  
Mossbauer spectroscopy  
Condensed matter physics  
Acoustics and inverse problem theory  
Magnetic thin films; Bioinformatics

**Electrical and Computer Engineering**

Development of advanced engineering visualization tools and courseware,  
Virtual reality and biomedical instrumentation  
Microelectromechanical systems (MEMS) research  
Microwave electrothermal micropropulsion systems  
Geo-spatial reasoning methods for aircraft synthetic vision systems

**Civil Engineering**

Adaptive structures and control technology  
Analytical and numerical modeling of land  
Remediation of biological warfare agents  
Earthquake resistant structures  
Analytical and experimental studies of adaptive retrofits to bridge girders  
Development of counter-rotating fly-wheel actuators

**Industrial Engineering**

Smart structures and active structural control for vibration suppression,  
Embedded sensors and actuators.  
Human factors psychology and social marketing  
Robotics & automation  
Routing and scheduling manufacturing systems  
Laser-based diagnostic instrumentation  
Reliability Engineering and Risk Assessment

**Transportation and Urban Infrastructure Studies**

Traffic and highway engineering  
Planning and management and logistics

**Community Health and Policy**

Behavioral Health Sciences  
Public Health Analysis  
Health Policy and Management

**Centers & Institutes**

MSU Centers & Institutes are important cross-disciplinary efforts that address research and manufacturing challenges too complex for single-investor programs. These Centers & Institutes provide focal points for the development and transfer of new technologies, processes and equipment in a cooperative environment with industry, academia and foundations.

**Patuxent Environmental and Aquatic Research Laboratory (PEARL)**

Invertebrate Population Ecology	Ecosystem Ecology/Predictive Modeling
Plankton Biology	Hyperspectral Remote Sensing
Monitoring of Power Plants for	Estuarine Ecology
EPA Compliance	Oyster Hatchery

**Center for Chemical and Biological Sensors Development and Characterization**

Much of the research efforts of the center are interdisciplinary around a central theme of development, synthesis and characterization of novel chemical and bio-analytical sensors.

**Center for Advanced Microwave Research & Applications (CAMRA)**

This NASA supported center focuses on research and technology developments and systems (amplifiers, mixers and LO's), and low power digital logic to support NASA's future Earth and Space Science missions.

in design and implementation of DSP systems using reconfigurable architectures.

**Center for Advanced Energy Systems and Environmental Control Technologies (CAESECT)**

Primary emphasis is on the development of new technologies to improve energy utilization.

Laser Doppler Velocimetry (LDV), Laser-based Particle Image Velocimetry (PIV), and Phase Doppler Particle Analyzer (PDPA) Applications on Atomization

Advanced Energy Systems

Advanced High Efficiency and Emissions Control Technology

Waste Management: Utilization and Disposal Testing, Hot Gas Clean Up/Gas Separation

Alternative Fuels/Renewal Energy Research: Fuel Cell, Geothermal Energy, Solar Energy, Biofuels Research

Energy and Environmental Management and Risk Assessment

Computer Simulation with Computational Fluid Dynamics (CFD) codes and Numerical Modeling, Visualization with High Performance Computing Applications.

**Center of Microwave /Satellite and Radio Frequency Engineering (COMSARE)**

Research focus is on microwave device and circuit simulation, neural networks, electromagnetic simulation and software development.

**Engineering Visualization and Semiconductor Characterization Group (EVSCG)**

This center focuses on development of high performance 3D graphics visualization tools, characterization of electronic structures and devices, and investigation of methodologies for better understanding of the behavior of electronic devices.

**Advanced Engineering Design and Manufacturing Center**

The Center involves reconfigurable manufacturing systems and focuses on the ability to rapidly respond to market changes in product variety and production volume using machines, equipment, and information systems.

**National Transportation Center (NTC)**

The center undertakes studies to optimize and improve transportation systems management and development. Current research emphasis is on the social economic, efficiency, emerging technologies and safety aspects of surface transportation.

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