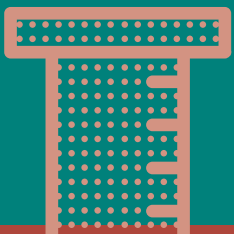


SIX-YEAR REPORT | 2014-2020

# How do you build a scientist?



  
**ASCEND**

ASCEND CENTER FOR BIOMEDICAL RESEARCH

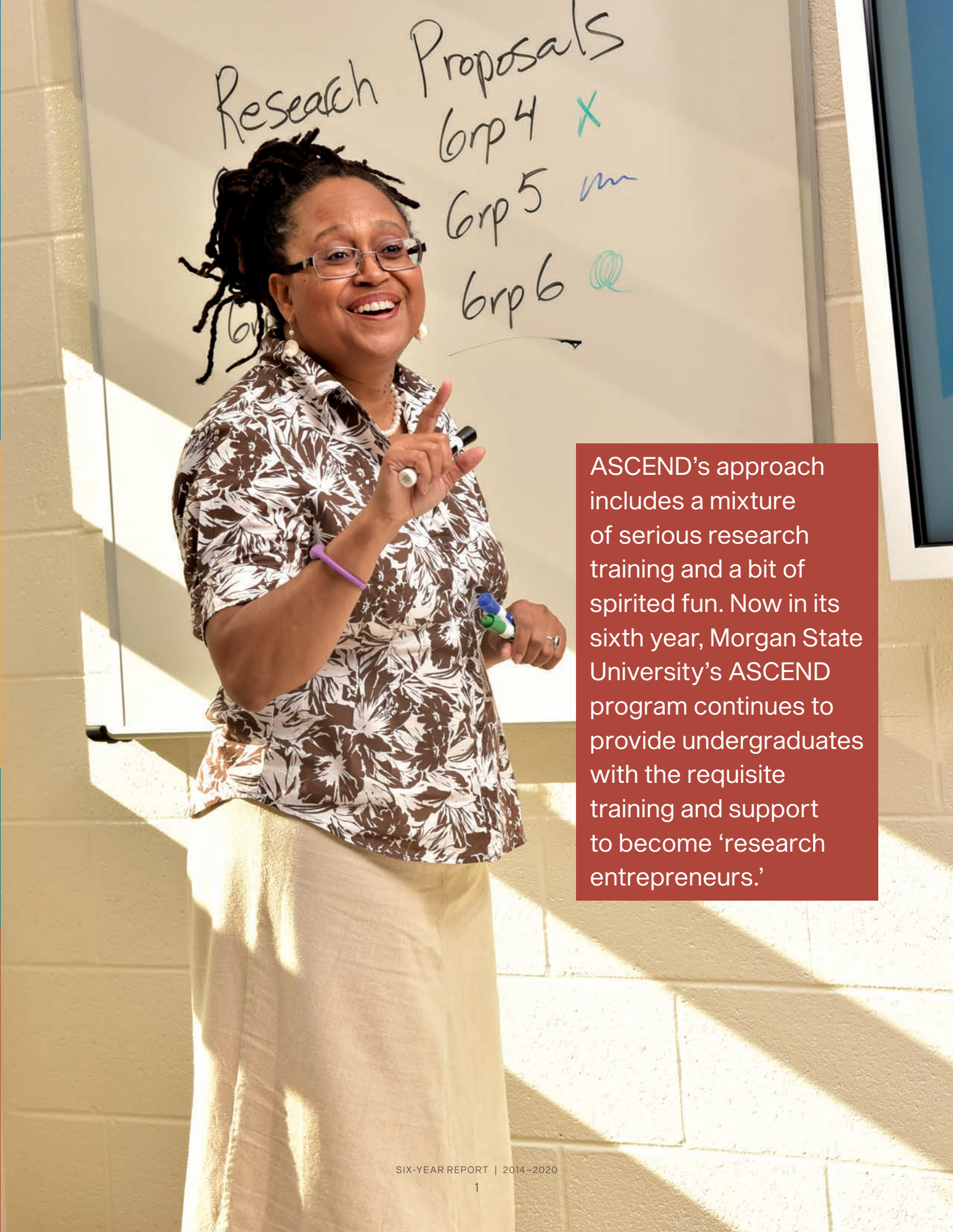




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Dr. Avis Jackson (photo right), research associate with the ASCEND Center for Biomedical Research and a devoted mentor to ASCEND students, recognizes how important it is for emerging scientists to be able to conduct real research early in their academic careers. She is proud of Morgan State University's rich history of supporting and training students to conduct research.



ASCEND's approach includes a mixture of serious research training and a bit of spirited fun. Now in its sixth year, Morgan State University's ASCEND program continues to provide undergraduates with the requisite training and support to become 'research entrepreneurs.'



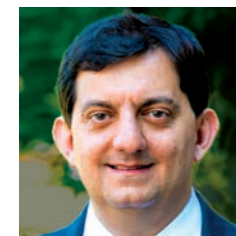
Dr. David Wilson  
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Dr. Willie E. May  
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Economic Development



Dr. Farin Kamangar



Dr. Payam Sheikhattari

## MESSAGE FROM THE MORGAN STATE UNIVERSITY ADMINISTRATION

**T**he French proverb, "Petit à petit, l'oiseau fait son nid," translates to, "Little by little, the bird makes its nest." Over the past 153 years, Morgan State University (MSU) has made its *nest* in Charm City. It has grown from the Biblical Centenary

School, with only a handful of students, to an anchor institution in Baltimore, with nearly 8,000 students.

MSU's *nest* has grown significantly in several dimensions. Its student enrollment, the quality and quantity of academic degree programs, the relationship with the surrounding communities, and research rankings have all grown. In 2017, MSU was designated as **Maryland's Preeminent Public Urban Research University**. In 2018, it received the Carnegie designation of Doctoral University-Higher Research Activity (R2).

Since 2014, ASCEND has been an integral part of MSU's growth, making major contributions in all dimensions. ASCEND has provided new methods of research training for students, critical resources for faculty to become stronger researchers and educators, state-of-the-art research and training facilities, and community based participatory research grants. We are very thankful to the National Institutes of Health and the ASCEND investigators for bringing these amazing resources to MSU.

While we are very proud of these accomplishments, we are determined to continue advancing this great institution, and ASCEND and its legacy will remain part of this noble goal. We will forge ahead. We will be true to our motto: *Growing the Future, Leading the World*.



## MESSAGE FROM THE PRINCIPAL INVESTIGATORS

**O**ver the past six years, ASCEND has worked to develop successful methods for training the next generation of biomedical researchers, particularly those from underrepresented minority backgrounds.

As the principal investigators, we have continuously sought to improve ASCEND by asking ourselves: Have we identified robust methods that help our students achieve a future as biomedical researchers? Have we equipped faculty to become more successful researchers? Have we materially contributed to enhancing pedagogy at MSU? Can ASCEND be sustained at MSU? Can it be replicated elsewhere?

There is quantitative and qualitative evidence that the ASCEND Student Research Center has been very successful in nurturing the academic, research, and leadership capacity of its student members. To formalize and disseminate its methods, the ASCEND investigators have developed the **Entrepreneurial Research Training Model (ERTM)**, a navigable framework for training undergraduate students to become leaders in research. A brief overview of the ERTM and its stages is offered in this report.

The dissemination of ASCEND methods, which emphasize student-led research and student-centered pedagogy, will be a major focus in coming years. Dissemination will be achieved via peer-reviewed articles and sharing of information widely, such as that shared with Hawaii Pacific University. The university recently received funding from NIH to establish a Student Research Center similar to that of MSU.

In the past few years, nearly 200 students representing biology, chemistry, psychology, and other biomedical disciplines have presented their research at national forums such as the Annual Biomedical Research Conference for Minority Students (ABRCMS). Many of these students were

trained and supported by ASCEND. Though it has been only a few years, we have an alumna, Jada Boyd, who recently received her doctoral degree from Duke University, along with others, such as Funmi Ayeni, who are completing doctoral degrees. The vignettes presented in this report are examples of our student achievements.

Over the past three years, MSU has reached new highs in grant funding, with over \$35 million coming from the National Institutes of Health, the National Science Foundation, the US Food and Drug Administration, and other funding agencies. ASCEND's investment in training and support has demonstrably contributed to the ability of faculty to submit grants and receive research awards. Some examples of faculty success have been showcased here.

ASCEND has supported faculty members to become more familiar with state-of-the-art pedagogy. It has funded the redesign of STEM courses to be more student-centered and research oriented. Physical spaces have been renovated to become active learning centers, encouraging open communication and collaboration. The result has been a collective move toward student-centered methods of teaching.

On a larger scale, MSU has taken steps to sustain ASCEND's achievements by improving its research policies and technical capacity and enhancing collaborations with research-intensive partners. This effort is ongoing, and we hope it will lead to building a much stronger research university.

On behalf of the ASCEND Team, we are very proud of these accomplishments, yet we continuously strive to be on an ASCENDING trajectory. We hope to be a small part of the very rich history of this great university and create a legacy that will remain many years after the generous NIH funding for ASCEND has ended. We hope you enjoy reading this report.

## Cultivate Innovation: Our Method

Entrepreneurs conceive of their own ideas, seek funding, and lead their ideas to fruition. Similarly, ASCEND research entrepreneurs conceive of their own research ideas, compete for funding, conduct their research, and disseminate the findings.



## ENTREPRENEURIAL RESEARCH TRAINING MODEL

It can be a challenge for novice researchers to come up with their own research ideas. Add to that the misconception that entrepreneurship is only relevant to business start-ups, and students may feel some trepidation about this concept. Consequently, ASCEND investigators developed the Entrepreneurial Research Training Model (ERTM) to help students gain greater confidence in their research and communication skills as they move to create an authentic science identity. In short, ERTM provides a navigable pathway for students to become research entrepreneurs. The model has four stages, each building upon strengths developed and lessons learned in the previous stages. The four stages include: attraction and inspiration; ideation and innovation; implementation; and growth.

**Attraction and Inspiration:** The initial stage is designed to inspire undergraduate students to engage in biomedical research, foster a sense of community, and confirm the belief that they can become future researchers. Students engage in extra-curricular and co-curricular activities, learn why health research can benefit their communities, and observe first-hand students who are not too different from them engaged in biomedical research. The desired results are enhanced peer support, increased interest in biomedical research, and the recognition that a variety of academic fields can and do contribute to health research.

**Ideation and Innovation:** Building on their interest in biomedical research, students are encouraged to innovate and devise their own research ideas. These ideas may arise from observations of a community's health needs, may build upon the research of other students or faculty, or could come from research seminars, workshops, or readings. At this stage, students learn basic research methods to gain a preliminary understanding of which research topics are feasible. There is continued emphasis on peer support, teamwork, and the opportunities offered by biomedical research.

**Implementation:** At this stage, ideas morph into more rigorous proposals and serious research. Students work closely with faculty mentors to design their study, submit their proposal for review, and receive approval from appropriate committees. They implement the research, acquire and analyze data, and begin to prepare reports. The main objective of this stage is to gain significant research skills. The emphases of the previous stages — enhanced peer support and science identity, innovative thinking, and teamwork — continue.

**Growth:** The focus in this stage is to enhance the capacity of students to disseminate the results of their research through presentations and publications. In addition, the time has come to expand their network beyond the students and faculty within their institution to the larger scientific community. Enhancing scientific writing, analytical competency, and public speaking skills are some of the main activities in this phase. Professional networking, résumé writing, and the pursuit of graduate school are important practical elements for continued progress.

While many ERTM elements (enjoyment, support, critical thinking, innovation, communication) are included in each stage, over time the emphasis shifts from enjoyment and working with friends to rigor and working with higher level scientists. While there is no guarantee that a student will become a novice researcher or that the novice will become a research entrepreneur, ASCEND's commitment to student development and the recognition that entrepreneurial skills can be learned increase the odds that a scientist will emerge from ERTM.



## PEDAGOGY

In an age when students can find instant information (accurate or not) about everything from DNA sequencing to the chemistry behind a successful chocolate soufflé, how can universities engage students for the length of time necessary for real learning to occur? Morgan State University acknowledged this challenge and embarked on enhancing its teaching methodology to offer an engaging student-centered pedagogy. Appreciating that today's learners are less receptive to the traditional teaching model of a faculty member lecturing to rows of front-facing students, MSU and the ASCEND program are designing classes to be more interactive and collaborative. In the sciences, especially, students want to learn from the successes and failures of their colleagues, and, importantly, want a forum to share their own successes and failures. As a result, ASCEND is assisting MSU faculty as they go on a learning journey of their own to develop an enhanced student-centered environment. Several steps are underway to help faculty acquire the necessary skills to implement more inspiring and student-centered teaching.

**Course Redesign:** Research indicates that students will develop greater science identity and perform better in their science classes when their learning experience connects with their real-life interests. Inquiry-based laboratories, research experiences, and appropriate technology are important components that forge such connections. Faculty were encouraged to submit course redesign and new course proposals focused on including these components and were awarded funding based on the course's ability to increase (a) student interest in STEM and social behavioral sciences at MSU, (b) enrollment and retention in specific disciplines, and (c) the number of students who transition into post-graduate research training. Outcomes for the course redesigns have been positive. Eighteen redesigned and new courses were funded, and several courses had substantial enrollment increases and exposed new student populations to biomedically-relevant content.

**Annual Scientific Teaching Summer Institute:** An intensive summer training institute for faculty was established in accordance with the model established by the National Summer Institutes on Scientific Teaching. Directed by Dr. Michelle Withers, the Principal Investigator for the National Science Foundation grant that funded the training, the

program was designed to enable faculty to conceptualize and implement student-centered teaching as well as improve science and health-related instruction. In 2018, 50 MSU faculty members, predominantly in the School of Computer, Mathematical and Natural Sciences were trained, and ten additional faculty members became instructors-in-training. MSU began developing its own scientific teaching program with a goal to substantially increase the number of trained faculty on campus. The 2019 summer institute had a record number of 56 registrants from MSU and Coppin State University, indicating both a commitment to the topic and the stellar reputation of the training.

ASCEND faculty are altering their methodologies to engage students more thoroughly in the subject matter, encourage discourse and questions, and help students to create their science identity. Faculty openness to making these changes in no way diminishes their commitment to scientific rigor or the expectations they have of their students' progress in research training. While the methodology may be less traditional, high-quality teaching remains a value preserved by Morgan State University.

**Active Learning Centers:** With funding from ASCEND, several classrooms have been redesigned as active learning centers. Groups of students meet at modular tables to foster active conversation and collaboration. In these classrooms, students and faculty have greater access to state-of-the-art technology, which allows for video, social media, and website enhancements to subject matter. The popularity of using such active learning centers, instead of traditional classrooms, is increasing at MSU, bolstered by the needs of students, the interest of faculty, and the supporting research.

MSU and ASCEND have taken major strides towards 21st century pedagogy with a potent combination of strategies. They have committed funds for student-centered course redesign, created and improved scientific teaching workshops, and redesigned classrooms and scientific spaces. Faculty will always have an essential role in nurturing the minds of students, but traditional methods will take a backseat as teachers serve more as "guides on the side, not sages on the stage."

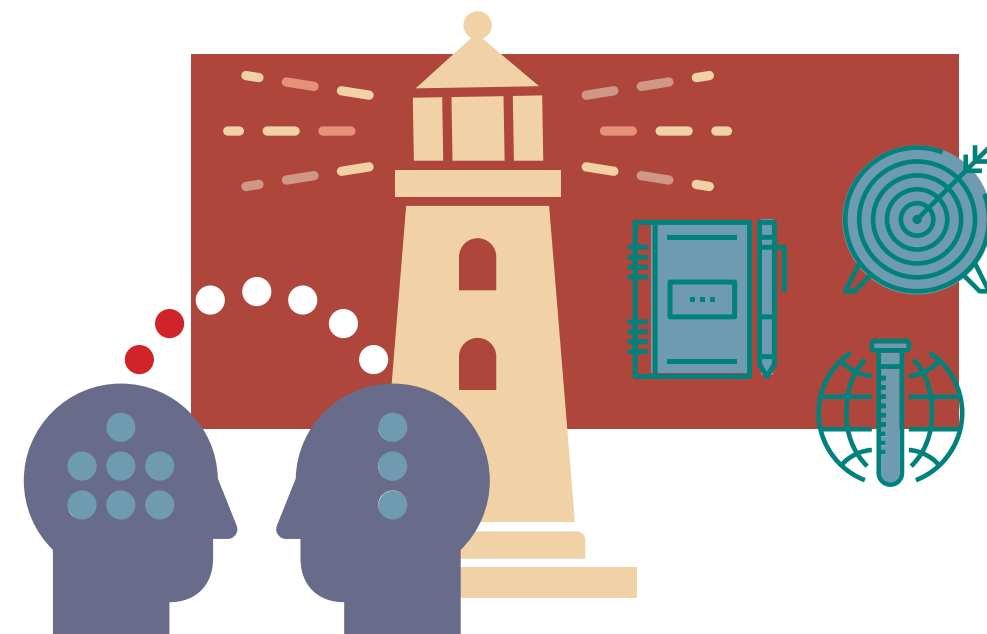
## MENTORING

Becoming an entrepreneurial researcher is not a haphazard process — at least not in the opinion of ASCEND administrators and faculty. They have created practical and supportive steps to help students, especially those from underrepresented minority backgrounds, achieve success in a challenging field. An especially valuable method has been the development of a three-tiered mentoring system that helps students navigate the stages of ERTM. An Individual Development Plan (IDP) is created to identify student goals and track progress based on hallmarks specific to the ERTM stages. Mentoring shifts from peer and near-peer mentoring in early stages to faculty mentoring in later stages.

In early ERTM stages, when students need inspiration and are interested in social interaction and community service, peer to peer mentoring is most helpful. Students form friendships and groups, and they are encouraged to fully engage in academic and social life. As students move on to the ideation and innovation stage, their mentors are more senior or graduate students with more research training and experience. Called near peers, these mentors play a critical role in bridging the gap between the student's readiness to enter research and the student's actual understanding of research. During this stage, students begin to formulate a research idea that might become a viable project in the future. The third stage of mentoring focuses on innovation and growth. Students and faculty collaborate on a research project that involves serious

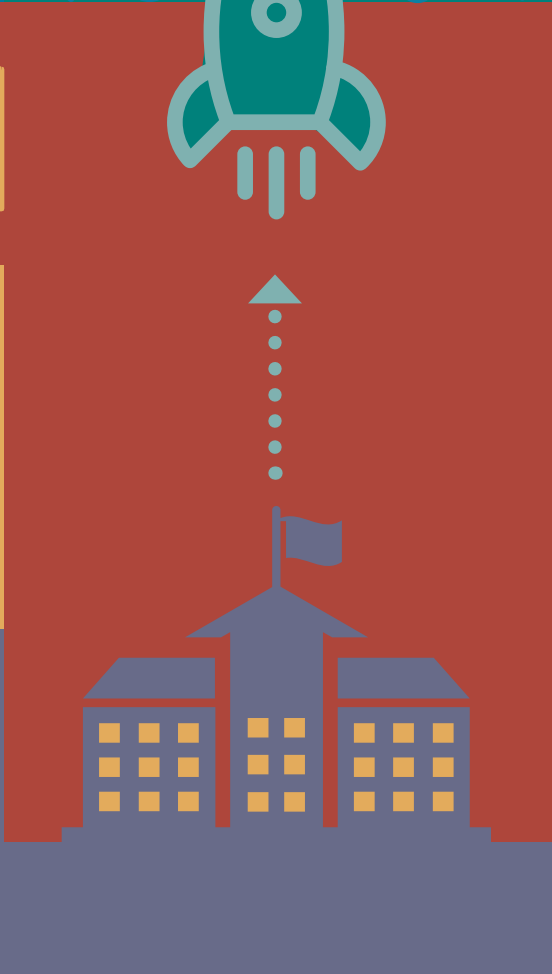
discussions of proposals, abstracts, and publications. Faculty become prominent during this stage of advanced training. In all stages, the diversity of mentors is highly valued. The inclusion of those with various levels of research experience and different cultural and ethnic backgrounds enriches the mentoring experience and provides useful perspectives.

Morgan State University has begun training faculty, staff, and near peers using the model offered by the National Research Mentoring Network at the University of Wisconsin-Madison. This model has been carefully developed and tested "to accelerate the process of becoming an effective research mentor." The Wisconsin model includes training on constructive and destructive group behaviors, aligning expectations of the mentors and mentees, and promoting professional development. Additional elements include methods for effective mentor/mentee communication and fostering independence, equity, and inclusion among students. As MSU further customizes the mentoring procedures, more individuals will likely participate in this worthwhile project to enhance student success. Students who are mentored are generally more likely to persevere in their chosen field and become mentors themselves. Faculty who become mentors are enriched by their interaction with emerging scientists and can select and train their own laboratory assistants. Mentoring is a win-win for all participants and for the communities these students will eventually serve.



## Add Curiosity: Our Students

When a student's eyes are opened to the possibilities of scientific exploration, amazing results can happen. While ASCEND serves as the catalyst and offers the entrepreneurial edge that encourages creativity, students are the key to the program's success.



## MARVELLOUS OKE

**M**arvellous Oke (Psychology '21) was happy to be disabused of the notion that all scientific investigation involved cells and molecules. A psychology major, Ms. Oke appreciated that type of science, but she welcomed the knowledge that approaches such as behavior, public health, and computer modeling were also essential investigation options. Ms. Oke was always interested in science and was firm in her decision to attend medical school. But her experiences in the Student Research Center (SRC), as an ASCEND Scholar in Cohort 3, and as a member of the 2017 Summer Research Institute (SRI) influenced her decision to pursue a dual degree MD/PhD program in the future. During her time in the SRI, she became one of the "Rat Pack," a group of students who

worked remotely with Dr. Craig Ferris, Director of the Center for Translational Neuroimaging at Northeastern University in Boston. Using MRI technology, the students looked at changes in the rodent brain after chronic exposure to marijuana smoke. Members of the "Rat Pack" were concerned that the verdict on marijuana's safety and long-term brain effects was not yet final. The results of their study were presented at the 2019 Annual Meeting of the Society for Neuroscience.

Traveling north for two summers, Ms. Oke was a fellow in the CLIMB UP program held at the University of Buffalo's Jacobs School of Medicine. CLIMB UP (Collaborative Learning and Integrated Mentoring in the Biosciences—Undergraduate Program) for Summer Research is an interdisciplinary 10-week-long summer program to conduct



research in the biomedical, behavioral, and health sciences. Using self-taught computer coding skills in MySQL and R, open-source database and statistical programs, Ms. Oke collected patient chart data to build a computer model that accurately predicts who might develop shunt-dependent hydrocephalus or swelling after a subarachnoid aneurysm. A predictive computer model could help doctors understand why and how this complication occurs.

Predictive modeling, MRI technology, and psychological changes are being used to expand the concept of what research is and how it can help diverse populations. Ms. Oke is enthusiastic about these approaches and is clear about one goal: "I want to see progress."

## AMARI CARTWRIGHT

No crystal balls or tea leaves were needed to grant Amari Cartwright (Biology '19) a glimpse into his future. By the end of his sophomore year, he had gained early acceptance to the prestigious George Washington University School of Medicine. His secret? Nothing magical. Just an inquisitive mind, diligence, and an openness to every available opportunity.

As a freshman, Mr. Cartwright worked in the laboratory of Dr. Gloria Hoffman (Professor, Biology) learning the basics of neuroscience research. He became an active member in ASCEND's Student Research Center (SRC) and participated in nearly every activity and served as the inaugural chair of the SRC's Journal Club. For his active involvement, he served as "Mr. SRC" for academic year 2017–2018. "The SRC is considered prestigious on campus, and I especially respect its role in encouraging students to do things they might not have done, such as applying for the SRC research awards," he says. He adds that involvement in the SRC makes it easier to try research or apply for a special internship. For Cartwright, as well as many other students, the SRC offers support and mentoring to ease the transition into the world of entrepreneurial research.

Mr. Cartwright's goal to attend medical school led him to Columbia University's Summer Medical/Dental Education Program where he joined other talented students who sought medical careers but were unsure of their specific discipline. Columbia's broad-based program offered a physician



shadowing program, which he found especially beneficial. The diversity of the faculty and student body encouraged discourse and new perspectives.

Mr. Cartwright embodies the entrepreneurial spirit and determination essential for a successful career in research. He appreciates that ASCEND's Student Research Center promotes a model that focuses on individual efforts and results. "Entrepreneurship is ideal for my generation because it fosters ownership, commitment, and creativity." For the future Dr. Cartwright, accountability is necessary for his personal satisfaction. His medical colleagues and patients will appreciate his commitment to accountability as well.

## FUNMILAYO OMOLE

Funmi Omole (Biology '20) would not trade her group research experience as an ASCEND scholar "for anything." Her small research team investigated the effects of sleep deprivation on performance of motor and memory tasks in Morgan undergraduates. She attributes the success of the research project to the group's commitment, an effective project manager (James Green, Cohort 3), and the support of near-peer mentor Kelly Boham (Cohort 1). In addition, faculty mentor Dr. Christine Hohmann (Biology) provided executive leadership, and student training core leaders Drs. Jocelyn Turner-Musa (Psychology) and Cleo Hughes-Darden (Biology) contributed to the success.

In fact, if anything sums up the uniqueness of the ASCEND Scholars Program, it is this steadfast involvement of true believers — both students and faculty — who are confident in the process and committed to the project. Ms. Omole became an ASCEND Scholar as a result of two important experiences. First, in her visit to the then-fledgling Student Research Center (SRC), she was attracted by the SRC's ambitious members and the wealth of opportunities. After joining the SRC, she participated in the 2017 Summer Research Institute (SRI), an experience that was both exciting and humbling. "I thought I knew how to write a proposal and develop research questions, but I had a lot to learn." Learn she did, and she expanded her knowledge as an ASCEND Scholar. ASCEND's mission



is centered on teaching research skills, but Ms. Omole feels that the life skills aspects of the program — time management, networking, and writing — were essential as well.

The combination of skills enabled her to earn an SRC-sponsored Health Research Concepts Competition award to investigate potential bacterial threats in MSU's gymnasium. By sampling gym equipment and using microbiology and molecular biology approaches, Ms. Omole identified two strains of resistant Staphylococcus. With her mentor, Dr. Mathu Rajavel (Associate Professor, Biology), she is looking at antibiotic-free solutions for disinfecting gym equipment to reduce bacterial infections. Ms. Omole's research projects have a public health component that exemplifies MSU's commitment to community health and will help her realize her goal of becoming an exceptional clinical laboratory manager.

## OLUWAFUNMILAYO AYENI

When our graduates move on from Morgan State University, they do not leave their curiosity behind. They continue to explore and excel in graduate and professional schools across the nation. As of December 2019, 25 ASCEND graduates have matriculated into master's degree programs, eight in PhD programs, and three in medical doctorate programs. The diversity of their master's and doctoral programs testifies to the academically well-rounded and individualized approach that characterizes ASCEND. Master's level concentrations include public health, healthcare management, psychology, social work, and nursing, among others. PhD concentrations include pharmaceutical science, physical therapy, biomolecular science, applied developmental psychology, molecular pharmacology and physiology, ecological and community psychology, and biochemistry. Funmi Ayeni, profiled below, is one example of an MSU alumna who carried her scientific passion to the next level.

Justice is not merely a word to Funmi Ayeni (Psychology '17). It is a call to action. Heeding that call has taken Ms. Ayeni from Maryland to Michigan and from an interest in justice for survivors of sexual violence to a calling. She earned her undergraduate degree in psychology from MSU and was a founding member of the Student Research Center as well as an ASCEND Scholar. With solid training from the ASCEND program and supportive mentoring from faculty, Ms. Ayeni was well prepared to enter the doctoral program in Ecological/Community Psychology at Michigan State University. As a third year doctoral student, her thesis study investigated a culturally specific intervention for African American women survivors of sexual assault. The study shed new light on the value of culturally specific sexual assault services. Along with her graduate studies, Ms. Ayeni works on policy development related to gender-based violence issues for the Division of Victim Services at the Michigan Department of Health and Human Services. She helped draft a bill, introduced to the

Michigan Senate, to keep confidential the physical address of victims of domestic violence, sexual assault, stalking, and human trafficking.

As a Nigerian-American, Ms. Ayeni recognizes the need for global awareness and action related to gender-based violence. She volunteers for the nonprofit Stand to End Rape (STER) and consults on programs, research, and policies that focus on women's rights and gender equality. One important result



Ms. Ayeni speaking with Dr. William LaCourse, Dean of the College of Natural and Mathematical Sciences, UMBC, at ASCEND's first-year anniversary celebration, held in the Graves School of Business.

has been the development of a comprehensive education program for elementary and high school students that teaches bystander intervention strategies and offers a group therapy program for self-identified female survivors of rape.

Intentional about community engagement, Ms. Ayeni also serves as a steering committee member of the Alliance for Graduate Education and the Professoriate (AGEP) at Michigan State. AGEP is a network of universities dedicated to increasing the number of underrepresented minorities in graduate STEM programs, a mission in harmony with that of her alma mater.

## STUDENT CONFERENCES AND COMPETITIONS

ASCEND's focus on entrepreneurial science encourages students to identify, design, and present the results of their own research projects.

### Annual Biomedical Research Conference for Minority Students (ABRCMS)

Scientific conferences are important avenues for disseminating such information in a public forum. For students, attendance provides opportunities for insight about their research and their presentation skills and offers unparalleled professional networking. Over the years, many Morgan State University students have presented the results of their findings at ABRCMS, using research that they conducted at MSU or during internships with partner institutions. Several have received ABRCMS awards.

#### 2016 Oral Presentation Awardee

**Deshawn Collington:** Sexual Assault Among College Students Attending A Historically Black University. Morgan State University ASCEND Center for Biomedical Research. *Mentor: Jocelyn Turner-Musa, PhD*

#### 2018 Poster Presentation Awardee

**Amanda Nweke:** CB2 Inhibitor: A New Binding Mechanism for MCT4 and Its Possibilities as a New Therapeutic Drug for Colorectal Cancer. Charles R. Drew University School of Science and Medicine. *Mentor: Seyung Chung, PhD*

#### 2019 Poster Presentation Awardees

**Marvellous Oke:** A Machine Learning Approach to Predicting the Possibility of Seizures During an Admission for Intracerebral Hemorrhage. University of Buffalo/CLIMB-UP. *Mentor: Peter Elkin, MD*

**Damion Trotter:** The Sleep-Wake Architecture of BACHD Mouse Model and Wild-Type in Relation to Sleep Deprivation. University of California Los Angeles/HBCU Neuroscience Program. *Mentor: Ketema Paul, PhD*

### Health Research Concepts Competition (HRCC)

As students become acquainted with scientific study, they begin to appreciate how important grant funding is to the advancement of their research. However, the grant application process can seem overly complicated to undergraduates. In response, ASCEND created the HRCC to provide students with the opportunity to conduct their own research with the goal of achieving funding. Faculty provide students with step-by-step guidance developing their concepts into abstracts. Strong abstracts can lead to a successful grant application and possible funding. This competition is held twice a year and up to \$5,000 is awarded for a successful health-related research project. To date, there have been six cohorts, 39 student applicants, and ten funded projects.

#### 2017 Awardees

**Hillary Ajifa:** Application of a Gel Layer in Microwave Heating of Synthetic Skin in the Metal-Assisted and Microwave-Accelerated Decrystallization Technique. *Mentor: Kadir Aslan, PhD*

**Amanda Fowler:** Analysis of Neuroglia in the Hippocampus of a Mouse Model of Rett Syndrome. *Mentors: Gloria Hoffman, PhD and Mary Blue, PhD (Kennedy Krieger Institute)*

**Godfrey Ndu:** Simulation of a Self-Sustaining/Standalone Bioreactor. *Mentor: Kadir Aslan, PhD*

**Raquel Shortt:** How Amygdalin Could Save Lives. *Mentor: Kadir Aslan, PhD*

#### 2018 Awardees

**Kingsley Anokwuru:** The Changes in Microbiome Diversity in the Jones Falls River Before and After Storm Water Runoff. *Mentor: Douglas Dluzen, PhD*

**Rachel Bauer:** Development of an Innovative Technological Platform to Study HIV Reservoirs in Monocytes and Macrophages. *Mentor: Yun-Chi Chen, DPhil*

**Ayanna Culmer-Gilbert:** Microwave Synthesis of FAC-Tricarbonyl (Pentylcarbonato) (a-Diimine) Phenium Complexes and Investigating their Anti-Cancer Activity. *Mentor: Angela Winstead, PhD*

**Kijah Jamerson:** The Effects of Cardiac Troponin I SER165 Phosphorylation on Actin-Binding Affinity and CTNI Proteolysis. *Mentor: Yuejin Li, PhD*

**Kaela Pone:** Tracing the Cell Sanctuaries for Mosquito Injecting-Viruses. *Mentor: Yun-Chi Chen, DPhil*

**Nathaniel Tyree:** The Protective Effect of Sarcomeric Protein Phosphorylation on Ischemic Hearts. *Mentor: Yuejin Li, PhD*



## Commit to Excellence: Our Faculty

ASCEND's faculty members are teachers, trainers, mentors, and researchers. They are cell biologists, neurobiologists, physicists, psychologists, physicians, and more. Dedicated to both the needs of their students and to their own research, they expertly juggle the commitments to scientific inquiry and the emerging scientists they train.



## DR. CLEO HUGHES-DARDEN

Dr. Hughes-Darden recognizes the life cycle in her leadership role as well as in her research on plant molecular and cell biology. As a seasoned researcher and Chair of the Biology Department, she helps prepare faculty for success. She advocates not only for new faculty members but also for mid-career faculty who started their tenure at Morgan State University when grant writing resources were more limited. She believes ASCEND resources are essential to the success of faculty. ASCEND supplies the necessary financial incentives that enable new and mid-career faculty to launch their research programs. Since these projects typically include the training of undergraduate researchers, ASCEND support fosters long-term faculty commitment and a pipeline of dedicated scientists. The continuation of the research cycle is immensely important to MSU's mission as a premier teaching and research institution that invests in community and global health solutions.

Dr. Hughes-Darden also serves as the Co-Director of ASCEND's Student Training Core. She notes that ASCEND's connections and positive reputation in the community have increased the number of external summer research internships available to MSU's STEM undergraduates. Because many of these internships are paid, students can take advantage of valuable community opportunities for learning and training in the sciences. ASCEND's Student Research Center (SRC) has been an especially important resource for students, offering a dedicated physical

space where students can mingle and share information about internships and other social and professional opportunities.

As students blossom under the watchful eye of Dr. Hughes-Darden, they begin to develop into enthusiastic ambassadors for MSU's research intensive programs. They are fortunate to have excellent models in the new and mid-career research professionals who exemplify the entrepreneurial spirit. As innovative thinkers and creative strategists, these faculty researchers are committed to expanding and sharing their knowledge. The combination of budding and seasoned researchers along with the artful leadership of Dr. Hughes-Darden ensures that students and faculty will continue to thrive and grow at MSU.



## DR. YUEJIN LI

**D**r. Yuejin Li understands the physiology of the heart, its health, and its diseases. But she tuned in to her emotional heart to determine her career. After completing a post-doctoral fellowship in pediatric cardiology at the Johns Hopkins University School of Medicine and participating in the JHU-MSU teaching fellowship program, Dr. Li sought a career path that offered teaching, mentoring, and community impact. She found that path as an MSU assistant professor of biology. In her class, Biology for Majors, Dr. Li teaches her students to question current knowledge, develop new hypotheses, collect and analyze data properly, and interpret the results.

Dr. Li focuses much of her efforts on teaching the critical thinking skills necessary for good scientific inquiry, and she rejoices in seeing her students awake to scientific curiosity and their own abilities. She notes that research training is excellent preparation for success in life — in addition to good research practices, students learn effective communication and other life skills. These practical offerings resonate with students. “My students are enthusiastic learners and are passionate about their communities. Abstract scientific concepts hold less interest for them than ways to contribute to the health and well-being of their communities.” Recognized for keeping student perspectives in the forefront, Dr. Li received ASCEND funding that enabled her to modify her course based on student-centered pedagogies. She won the MSU Teacher of the Year award in 2018 for her efforts.



Dr. Li is currently investigating underlying heart muscle dysfunction in heart disease. Two ASCEND Scholars, one non-ASCEND undergraduate, and one graduate student work in her laboratory. Their work is supported by a grant from the Maryland Department of Transportation (MDOT). Her lab exemplifies one of ASCEND’s greatest strengths — students from a cross section of disciplines collaborating on important research questions.

As a new faculty member, Dr. Li has already made outstanding contributions to MSU as a recipient of ASCEND awards, MDOT grant funding, and a recently awarded grant from the National Institutes of Health. Dr. Li’s recognition is well-deserved, and her commitment to science, students, and MSU is heartfelt.

## DR. BIROL OZTURK

**A**s a physicist, Dr. Ozturk strives to understand the motion and behavior of matter through space and time. That’s also a good way to describe the way he operates his open concept laboratory. Students and colleagues swirl about creating an interactive environment that increases cooperation, knowledge, and opportunities for mentorships. After receiving his PhD in photonics from Oklahoma State University, he was a researcher at Brookhaven National Laboratory and Northeastern University. He admired the cooperative education model that is a hallmark of Northeastern University’s academic programs. He brought aspects of that model to MSU by enlisting students to volunteer in his lab and participate in live teaching partnerships on nanotechnology with Northeastern University colleagues.

Looking at ways to engage more students in discovery, Dr. Ozturk turned to computational research (also called scientific computing), an interdisciplinary area of science that develops models and simulations to understand natural systems. He launched a computational research lab at MSU, created a student computational club, and added computation to courses in the physics department. Because of his vision, openness, and entrepreneurial spirit, undergraduates can get a glimpse into computation — likely an integral part of most scientific research in the future.

ASCEND has played an important role in Dr. Ozturk’s ability to make a difference at MSU. With ASCEND funding, he was able to purchase a scanning electron microscope for

the physics research faculty. In his ASCEND funded pilot research project, he was able to begin work on a nano-sensor for adenosine triphosphate (ATP), a nucleotide that is the primary source of energy in all living cells. He is collaborating with Dr. Gerald Rameau, MSU associate professor of biology, to test the sensor in the cell-based models that Dr. Rameau routinely uses in his research. The potential applications of their collaborative research stretch from basic cell biology to medical diagnoses, from medical treatments to agriculture.

Dr. Ozturk envisions the School of Computer, Mathematical & Natural Sciences as a haven for entrepreneurs, a social and academic hub where people, ideas, and technology bump up against one another in an open, interactive environment.



## Focus on Sustainability: Our Future

Institutional commitment is key to the future success of our innovative program. MSU helps sustain ASCEND's mission through infrastructure support and by teaching researchers to be effective grant seekers. Students and faculty alike proudly share ASCEND's many successes and research findings with a wide audience.



## CONTRIBUTIONS AND ENHANCEMENTS

**A**SCEND has made considerable contributions to Morgan State University's research infrastructure and impressive enhancements to student training, faculty research support, and laboratory facilities. But ASCEND can have a broader impact by sharing its successful program structure for replication by other institutions. To address the goal of a broad and lasting impact, administrators developed a comprehensive plan that focuses on improving academic training, research facilities, financial sustainability, and wider dissemination of ASCEND successes.

Significant changes which will increase program effectiveness and sustainability are in store for Phase 2 (2019–2024) of ASCEND. In Phase 1 (2014–2019), the Summer Research Institute (SRI) was supported by NIH funds. In Phase 2, the SRI will be replaced by two courses offered during the academic year. This will enable more students to participate in research training without sacrificing summer jobs and internships. In addition, eliminating the stand-alone SRI will reduce supplemental university costs and ensure the sustainability of the program.

The selection of ASCEND Scholars will also undergo changes. In Phase 1, ASCEND Scholars were recruited from a pool of SRI applicants. In Phase 2, Scholars will be recruited from members of the Student Research Center (SRC). These recruits are expected to have substantial research and leadership experience. The selected Scholars, now financially supported by the MSU Honors College, will benefit from high quality academic training and mentoring. In turn, Scholars are expected

to serve as peer mentors to more junior researchers, thereby creating a pipeline of interested and qualified student scientists.

Sustainability efforts extend to faculty development and fundraising as well. In Phase 1, ASCEND made significant institutional and faculty investments through pilot grants, professional development opportunities, and resource allocations. In Phase 2, faculty will be more responsible for securing grants and other research funding from external sources. ASCEND and MSU administrators are collaborating to revise internal policies to help train, support, and incentivize faculty to seek external resources.

### Dissemination of Successes

ASCEND researchers, faculty, and students have much to share with other academicians who wish to offer a similar student research program on their own campuses. In fact, sharing ASCEND's successes is the best way to preserve and expand its reach to future scientists. ASCEND researchers plan to disseminate their findings through participation in conferences and specialized symposia, through publication in peer-reviewed journals, and by direct collaboration with universities.

ASCEND investigators have already shared the methods and results of their Student Research Center accomplishments in peer-reviewed publications. They have presented SRC results at the American Public Health Association Conference and disseminated information to Hawaii Pacific University and University of Michigan, among others.



## RESEARCH LABORATORIES

As MSU's research portfolio expands, so too does the necessity to acquire key laboratory equipment that enables researchers to conduct complex and replicable experiments. It is difficult and costly to purchase equipment with small grants, yet the lack of essential equipment makes it more difficult to obtain larger grants. One solution, supported with ASCEND funding, was the establishment of a Core Laboratory.

The Core Laboratory is housed in the Dixon Research Building along with a support team whose mission is to ensure that researchers meet their scientific goals. The lab offers research capabilities in preparatory technology (e.g., harvesting cell cultures, tissues, and organs), separations technology (e.g., separating proteins and nucleic acids), analytics technology (e.g., examining gene expression changes), and histologic analytics technology (e.g., tissue sectioning, staining, and microscopy).

In addition, essential equipment purchases have led to expanded research options. Purchases include: ProteinSimple Wes System, Luminex MagPix System, Bio-Rad NGC Quest 10 System, Pelco Pella BioWave Pro Microwave System, Bio-Rad CFX96 Touch Real-Time PCR Detection System, and Nikon upright and inverted light and fluorescent microscopes.

The Core Laboratory is not the only facility to receive funding from ASCEND. In 2019, ASCEND helped to fund an Animal Research Core (ARC) vivarium. Established in MSU's Jenkins Hall, the vivarium provides individually ventilated housing for 250 mice and 1250 rats. ARC developed standard operating procedures for the ethical and responsible treatment of the animals, and MSU's Institutional Animal Care and Use Committee approved two animal research protocols.

The University applied for certification to use controlled substances in research, a credential necessary for substance abuse research with rodent models.

ASCEND also purchased a Vium™ digital vivarium system to provide housing for up to 60 additional rodents with 24-hour activity and biometric tracking, allowing trained users to efficiently run experiments and digitally store data. MSU is currently the only facility in Baltimore with this apparatus. Other equipment purchases include the IWORX animal physiology teaching kit and a Med-Associates modular rodent behavior testing system with operant chambers and data analysis software. In October 2019, MSU offered the first quarterly training workshop on health and safety procedures and the use of laboratory rodents in research.

ASCEND also provided funding to train five undergraduate researchers to analyze rodent brain tissue data during the summer of 2019. In early 2020, the ARC's consulting veterinarian will lead the first semi-annual review and facility assessment as MSU completes compliance documentation for NIH assurance certification. This certification is an essential eligibility requirement for funding to support research and training with non-human subjects.

Both the Core Laboratory and the Animal Research Core are important components for building MSU's capacity for supported innovative research. As MSU's capacity to conduct advanced research and provide advanced training grows, the ability to attract competitive grant funding will increase as well.

ASCEND investigators have invested a great deal of thought and effort into creating a plan that will extend ASCEND's reach and influence in the coming years. Program changes, dissemination plans, and improved laboratory facilities serve the students, researchers, the university, and its partners exceptionally well.



Dr. James Wachira, Director, and Dr. Elizabeth Rodriguez, Manager, of the ASCEND Core Lab reviewing data on protein expression and modification.

## ASCEND TEAM

### Principal Faculty

**Christine Hohmann, PhD**  
Director, REC | SCMNS

**Mian Hossain, PhD**  
Faculty, IDC | SCHP

**Cleo Hughes-Darden, PhD**  
Co-Director, STC | SCMNS

**Farin Kamangar, MD, PhD**  
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**Payam Sheikhattari, MD, MPH**  
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**Ingrid Tulloch, PhD**  
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**James Wachira, PhD**  
Director, IDC | SCMNS

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**Shiva Mehravaran, MD, MIH**  
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**Shamara Murphy, MBA**  
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**Netta Pinchback, MS**  
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**Elizabeth Rodriguez, PhD**  
Core Laboratory Manager

**Gillian Silver, MPH, CPH**  
Associate Director for  
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**Wanda Wiggins, MSM, MBA**  
Project Administrator, STC

### NIH Officials

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### ASCEND Scholars' Near-Peer Mentors, Instructors, and Support Staff

#### NEAR-PEER MENTORS

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**Oluwatoyin Ajayi, MPH**

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**Karin Yearwood**

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**Erika Whitney, PhD**

#### SUPPORT STAFF

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**Bukky Babalola**  
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**Korede Oluwasuji**  
Academic Coach

### ASCEND Scholar Ambassadors

**Bolutife Baiyewu**

**Jade Dodge**

**James Green**

**Marvellous Oke**

**Christine Okemkpa**

**Funmilayo Omole**

**Henry Onyedum**

**AC:** Administrative Core  
**CLA:** College of Liberal Arts  
**IDC:** Institutional Development Core  
**REC:** Research Enrichment Core  
**SCHP:** School of Community Health and Policy

**SCMNS:** School of Computer, Mathematical, and Natural Sciences  
**SRC:** Student Research Center  
**SRI:** Summer Research Institute  
**STC:** Student Training Core

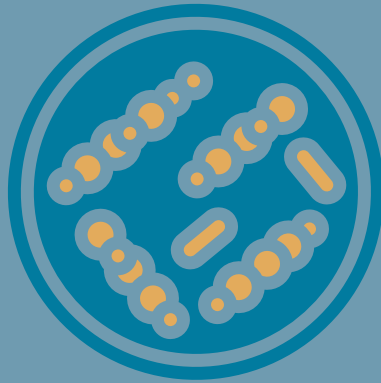
*This publication was supported by the National Institute of General Medical Sciences, National Institutes of Health, under award numbers UL1GM118973, RL5GM118972, and TL4GM118974. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. Published August 2020.*

## ASCEND BY THE NUMBERS

Students	
103	<b>undergraduate students</b> participated in the three Summer Research Institutes (SRI).
27	<b>group research proposals</b> developed and presented by SRI participants.
84	<b>undergraduate students</b> enrolled in the ASCEND Scholars program.
323	<b>undergraduate-student members</b> of the Student Research Center to date.
267	<b>undergraduate student research projects and internships</b> , completed over the summer or during the academic year, either on- or off-campus.
80	<b>ASCEND Scholars'</b> abstracts accepted for the ABRCMS (2016, 2017, 2018, 2019) annual meetings.
47	<b>ASCEND Scholars</b> have graduated from MSU.
35	<b>ASCEND-supported students</b> attending (or completed) graduate school.
19	<b>ASCEND Scholars</b> attending (or completed) graduate school.
94	<b>students</b> participated in external poster or oral presentations.
42	<b>HRCC* student concepts</b> submitted.
17	<b>HRCC* student proposals</b> developed.
11	<b>HRCC* student proposals</b> approved.
10	<b>students</b> started a HRCC* awarded project under guidance of faculty member (\$5,000 per project).
Faculty	
14	<b>grant writing workshops</b> offered to MSU faculty members applying for pilot research and community-based participatory research (CBPR) grants.
64	<b>ASCEND pilot research grant proposals</b> submitted by MSU faculty members.
33	<b>CBPR+ Small Grant proposals</b> submitted by MSU faculty members in collaboration with community organizations.
206	<b>CBPR+ faculty and community experts</b> from the U.S. and beyond reviewed the ASCEND pilot research and CBPR proposals.
18	<b>course design or redesign grants</b> awarded to Morgan State faculty members.
28	<b>travel grants</b> awarded to MSU faculty to attend conferences to enhance their pedagogical expertise or to attend scientific meetings in their fields of research.
18	<b>faculty and doctoral students</b> have received statistical data analysis support from Dr. Mian Hossain, Professor of Biostatistics, School of Community Health & Policy.
98	<b>MSU faculty, staff, and graduate students</b> have attended mentoring workshops.
89	<b>MSU faculty, staff, and graduate students</b> have attended scientific teaching workshops.
44	<b>articles</b> by ASCEND-supported faculty (and students!) published in peer-reviewed journals.
Institution	
9	<b>spaces within MSU's Science Complex</b> renovated to form Active Learning Centers and a Student Research Center.
30	<b>pieces of scientific equipment</b> purchased for the Core Laboratory or for ASCEND-supported faculty investigators.
1000s	<b>of journals</b> , previously inaccessible, available online through MSU's library.
10	<b>research partner institutions.</b>
\$40M+	<b>total institutional grant funding.</b>

\*Health Research Concepts Competition (HRCC)

+Community-Based Participatory Research (CBPR)



# ASCEND

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PROGRAM  
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