2019 TESTIMONY TO THE MARYLAND GENERAL ASSEMBLY

ADVANCING MARYLAND

PRESENTED BY
WALLACE D. LOH, PRESIDENT
UNIVERSITY OF MARYLAND
EXCELLENCE
AND IMPACT

As 2019 begins, student and faculty excellence define the state’s flagship university.

Our latest freshman class was our strongest yet, coming with record high credentials—a reflection of the university’s academic success and national standing. The curriculum is growing to meet the changing needs of undergraduates and those seeking advanced degrees, including career professionals. New, advanced facilities are helping researchers and students define the future. Our research enterprise leads in many fields nationally and internationally.

This has helped attract some $2 billion in private-public investment to Greater College Park, sparking an explosion of economic development. Our growing Discovery District is enhancing the university’s reputation as an innovation hub, particularly in computing and data science.

Faculty, students and staff deliver a wide range of services to citizens, businesses and decision makers statewide. The University of Maryland Extension’s advice to farmers raised their average profitability more than $14,000 in 2017. It is also helping urban farmers in Baltimore and Prince George’s County establish financial viability while providing fresh food.

These accomplishments and impacts are made possible by your unwavering support. Thank you.

We will continue using it to power Maryland today and tomorrow.

Sincerely,

WALLACE D. LOH
President, University of Maryland
EDUCATING A TOP WORKFORCE

Academic Success

86.2% GRADUATION RATE (2012 COHORT)
Highest six-year graduation rate in the University System of Maryland (USM)

11,161 DEGREES AWARDED (FY 2018)
Bachelor’s: 7,559
Master’s: 2,930
Doctoral: 672

4,332 STEM DEGREES AWARDED (FY 2018)
Most in the state, up 10% over 2017

Graduates’ Job Readiness (2017)

92% PLACEMENT RATE
(job or advanced education)

47% WORK IN MARYLAND

$52,608 MEDIAN SALARY

77% HAD AT LEAST ONE INTERNSHIP

Student Profile (Fall 2018)

41,200 TOTAL ENROLLMENT
Graduate students: 10,438
Undergraduates: 30,762

Freshman Credentials (Fall 2018)

4.28 AVERAGE GPA

SAT SCORES
1460 (75th percentile)
1380 (midpoint)
1310 (25th percentile)
From 33,568 new freshman applications, 4,714 enrolled

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EXPANDING EDUCATIONAL EXCELLENCE

Select Rankings

KIPLINGER’S PERSONAL FINANCE’S BEST COLLEGE VALUES (2018):
No. 10 among U.S. public institutions (in-state)

FORBES MAGAZINE’S AMERICA’S TOP COLLEGES (2018):
No. 12 among U.S. public institutions

MONEY MAGAZINE’S BEST COLLEGES (2018):
No. 18 among U.S. public institutions (No. 1 in Maryland)

THE PRINCETON REVIEW’S TOP SCHOOLS FOR UNDERGRADUATE ENTREPRENEURSHIP (2019):
No. 8

THE ECONOMIST (2018):
No. 11 U.S. executive MBA programs

CSRANKINGS.ORG (2018):
No. 10 U.S. computer science program
No. 7 for artificial intelligence among U.S. public institutions

U.S. NEWS & WORLD REPORT (2018):
Global: No. 15 among U.S. public institutions
Best U.S. colleges: No. 22 among U.S. public institutions
Online MBA programs: No. 8
Graduate programs: 34 in the top 20, including No. 1 in the U.S. for criminology; No. 1 for educational counseling; No. 2 for African-American studies; No. 12 for aerospace engineering

Diversity

DIVERSE: ISSUES IN HIGHER EDUCATION “TOP MINORITY DEGREE PRODUCER” (2018):
Undergraduate (African-Americans): No. 2 social sciences; No. 4 agriculture; No. 4 foreign language; No. 5 natural resources
Master’s (African-Americans): No. 4 engineering; (all minorities) No. 3 interdisciplinary studies
Doctoral (all minorities): No. 1 mathematics
Graduate degrees (African-Americans): No. 1 in Big Ten for engineering and education

CAMPUS PRIDE (2018):
A top LGBTQ-friendly college

BEST COLLEGES (2018):
No. 2 among U.S. public institutions for LGBTQ students; No. 7 overall

12 New Programs
including doctoral and master’s in environmental health sciences; a minor in naval science; and a new low-cost online MBA.

College of Education
revamped its degree programs to help the state address critical teaching shortages.

School of Public Policy’s first undergraduate class received degrees in May.

College of Agriculture and Natural Resources’ freshman class nearly doubled in 2018.

Philip Merrill College of Journalism
The college revamped its undergraduate curriculum, and enrollment doubled in 2018.

Real-world impact: Investigation by Capital News Service students led a nursing home operator to pay $2.2 million to settle a state lawsuit.

The university’s “Year of Immigration” programs stimulate campus conversation and deepen knowledge of critical immigration, migration and refugee issues. They also help students, faculty and staff engage with neighboring immigrant and international communities.
The Brendan Iribe Center will open in Spring 2019, supporting advanced research, education and innovation in fields like virtual and augmented reality.

Construction is beginning on the E.A. Fernandez IDEA Factory for engineering research and innovation.

Scholarship Success

99 MAJOR NATIONAL AWARDS

8 BOREN SCHOLARSHIPS
For study of critical foreign languages

11 FULBRIGHT SCHOLARSHIPS
For international educational exchange

28 GILMAN SCHOLARSHIPS
U.S. Department of State

4 GOLDWATER SCHOLARSHIPS
STEM studies

4 HOLLINGS SCHOLARSHIPS
National Oceanic and Atmospheric Administration

Do Good Initiative

1,433 STUDENTS TAKING DO GOOD-RELATED COURSES (2017-18)

250 TEAMS IN DO GOOD CHALLENGE (2018)

Top Do Good Competition Winners

Synapto, a student biotech startup, won first place for its effort to revolutionize early Alzheimer’s diagnosis.

Terp Thon, a student charity dance marathon, won first place for raising over $4.2 million in nine years on behalf of Children’s National Health System.
An aerospace engineering team took second place in a Northrop Grumman student design competition for “ExoHand,” a device to control a robot’s gripper.

A team of Terp graduate students won the U.S. Department of Housing and Urban Development’s 2018 Affordable Housing Competition for designing Beacon Crossing, an affordable 154-unit project for seniors and adults with disabilities.

Professor of higher education Alberto Cabrera and associate professor of school psychology Colleen O’Neal won Fulbright awards.

Elizabeth Acevedo M.F.A. ’16 won the 2018 National Book Award in Young People’s Literature for her debut novel, “The Poet X.”

The National Academy of Sciences awarded assistant professor of urban planning Marcus Hendricks an Early-Career Gulf Research Fellowship to study infrastructure and environmental hazards.

David Driskell, distinguished university professor emeritus of art, and engineering professor Elaine Oran were elected to the American Academy of Arts and Sciences. Oran was also named an elected fellow of the American Association for the Advancement of Science.

Journalism professor Linda Steiner won the International Communication Association’s Teresa Award for the Advancement of Feminist Scholarship.

Christine Antonsen MBA ’18 won Women in Technology’s Rising Star award.

Peter Reuter, professor of criminology and public policy, won the 2019 Stockholm Prize in Criminology for his research on drug enforcement.
Finance professor Michael Faulkender was confirmed to the post of assistant secretary of the treasury for economic policy.

Michel Cukier, associate professor and director of the Advanced Cybersecurity Experience for Students program, was honored by the SANS Institute as a 2018 “Difference Maker.”

Maissam Barkeshli, assistant professor of physics, to study quantum systems

Jordan Boyd-Graber, associate professor of computer science, to study human-computer cooperation

Marine Carpuat, assistant professor of computer science, for development of language technology

Vanessa Frias-Martinez, assistant professor of information studies, to study responses to emergencies

Osvaldo Gutierrez, assistant professor of chemistry and biochemistry, to develop toxic metal replacements

Jin-Oh Hahn, associate professor of mechanical engineering, to develop novel technologies to improve care for critically-ill patients

Steven Jay, assistant professor of bioengineering, for new approaches to wound and blood vessel repair

Stuart Laurence, assistant professor of aerospace engineering, to reduce machine noise

Peter Nemes, associate professor of chemistry and biochemistry, to study cell, tissue and organ formation

Yueming “Lucy” Qiu, assistant professor of public policy, to transform analysis of home energy efficiency

Brianna Queen ’19 is founder and CEO of Bee-Q-Box, a company that has sold more than $100,000 in alcohol-free, silicone-free, cruelty-free, vegan cosmetics and skin-care products.

Richard Kong ’21 owns Gravity Tales, a company that translates Chinese and Korean fantasy novels into English.

Jasmine Snead ’18 launched Aurora Tights, a line of dance and ice skating tights in tones for all complexions and sizes.
Research Success

$545,314,107
TOTAL RESEARCH AWARDS

Federal: $371,357,141
Corporations/Foundations/Other: $123,852,420
State: $50,104,546

$472,792,328
TOTAL RESEARCH EXPENDITURES

NEW GRANT-FUNDED CENTERS

Center of Excellence in Regulatory Science and Innovation (renewed)
Howard Center for Investigative Journalism
Maryland Transportation Institute

MULTIMILLION-DOLLAR RESEARCH GRANTS TO UMD WILL SUPPORT:

Building world’s first practical quantum computer (with other leading institutions)
Mitigating Maryland Eastern Shore saltwater intrusion
Economic development planning for Purple Line communities
Reducing transportation energy use and emissions
Increasing human papillomavirus vaccination of African-American adolescents
Assessing mental health of K-12 students
Improving cancer prevention among Baltimore African-Americans
Identifying young children’s language disorders
Developing next-generation HIV immunotherapy agents
Accelerating development of pediatric medical devices
Creating new treatment for non-healing wounds
Identifying best practices to prepare a diverse science workforce
Research Tipping Points

**Computing**

**VIRTUAL/AUGMENTED REALITY:** UMD researchers found people remember information better when presented in a virtual environment—one of the first studies to assess the technology’s educational impact.

**ARTIFICIAL INTELLIGENCE:** Maryland engineers and computer scientists found that humans do best at face recognition when assisted by artificial intelligence.

**ARTIFICIAL INTELLIGENCE:** A UMD entomologist is using machine learning to identify plant species at risk from climate change.

**Energy and Material Science**

Researchers from UMD, the U.S. Army and the U.S. Department of Energy are developing advanced battery technology to improve the range and safety of electric car batteries.

UMD engineers developed a safer high-performance, water-based zinc battery.

An engineering team found a way to create a “superwood” stronger than steel.

**Climate Change**

**POLICY:** UMD Center for Global Sustainability report found actions by states, cities, businesses and universities have already put the United States two-thirds of the way to meeting its Paris Climate Agreement commitment. The center also leads research for the Global Commission on Adaptation.

**MONITORING:** UMD and University of Texas researchers issued the first national assessment of the scope and consequences of U.S. urban flooding.

**MONITORING:** UMD teams reported the Sahara Desert is expanding; documented Antarctic ice loss; concluded that more than one-fourth of recent world forests losses may be permanent; and predicted that large-scale Saharan wind and solar farms would increase rain and vegetation.

Geographical sciences professor Ralph Dubayah, principal investigator of the Global Ecosystem Investigation Instrument (GEDI) mission with NASA, will use a laser in space to measure carbon content in Earth’s forests.

**Bioscience, Biotechnology and Health**

UMD scientists working individually or on multi-institutional teams developed a breakthrough technique to combat cancer drug resistance; learned how Lyme disease outsmarts the human immune system; discovered an inherited brain pathway that can pass anxiety disorders to children; showed how easily the flu virus can be spread just by breathing; sequenced the wheat genome, creating opportunities to grow improved strains; demonstrated that drones can safely deliver human organs for transplant.
The global race to develop a quantum computer—a device exponentially more powerful than current supercomputers—runs through College Park. UMD physicist Christopher Monroe and his company, IonQ, unveiled two embryonic systems that have proven to be the most powerful quantum computers in the world. Monroe also played a leading role in the recent passage of the National Quantum Initiative to ensure U.S. competitiveness, helping to draft the legislation.
Filling the Innovation Pipeline

Successful Startups

GripBoost now offers its glove grip-enhancing sprays for baseball, golf and football.

IonQ, a University of Maryland spinoff leading the race to create the first quantum computer, expanded its team 36 percent in 2018 and attracted new investors.

SecondWrite, offering advanced malware detection products, secured $1.6 million in funding.

gel-e’s bandages, designed to stop bleeding, got U.S. Food and Drug Administration clearance for prescribed and over-the-counter use, as well as a $1.4 million Department of Defense grant and $3.1 million in private financing.

North American Wave Engine Corporation’s jet propulsion applications raised $1.45 million in 2018.

Hazel Analytics, a joint UMD-University of California, Los Angeles startup providing food safety data and analytics to restaurants, added new national clients, including Subway, Cheesecake Factory, Chick-fil-A and Jack-in-the-Box.

Zest Tea raised $1 million in private and Maryland Momentum Fund financing for its caffeine-enhanced teas.

2018 INVENTIONS OF THE YEAR

1. Interface for enhanced electric vehicle charging

2. Flexible urinary catheter insert to detect and prevent bacterial infections

3. System for large-scale facial verification and search
$3.16 BILLION Annual economic impact on state

**2018 UMD Startups to Watch**

- **5 NEW STARTUP COMPANIES**
- **15 NEW LICENSES**
- **35 U.S. PATENTS ISSUED**
- **181 NEW DISCLOSURES RECEIVED**
- **100 NEW AGREEMENTS EXECUTED**
- **9 MII* AWARDS FOR $1.14M**
- **$1.25M LICENSE INCOME**

### Small Business Development Center (2018)
- **6,300 ENTREPRENEURS/SMALL BUSINESSES SERVED**
- **1,800 JOBS CREATED STATEWIDE**
- **$81.9M LOANS AND FINANCING**

### Maryland Industrial Partnerships
- **6,300 ENTREPRENEURS/SMALL BUSINESSES SERVED**
- **1,800 JOBS CREATED STATEWIDE**
- **$34.9B CUMULATIVE SALES GENERATED**
- **7,150 CONTINUING JOBS SUPPORTED**

### Annual Tax Revenue Generated
- **STATE: $166M**
- **COUNTIES: $125M**

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*MII: Maryland Innovation Initiative*
The new Capital One Tech Incubator, a partnership between UMD and the Fortune 500 company, offers research opportunities in machine learning and data science, as well as a career pipeline for students.
The Lab for Applied Social Science Research provided implicit bias training to 12 Maryland police departments. It is also surveying police attitudes on implicit bias, profiling and the impact of body-worn cameras.

The Center for Transition and Career Innovation for Youth with Disabilities will advance workforce readiness and college and career outcomes for youth with disabilities.

The Maryland Global Export Consulting program, in its second year, is helping state companies enter the international marketplace.

The Purple Line Corridor Coalition, led by UMD’s National Center for Smart Growth, received a $2 million grant from the Federal Transit Administration and the Maryland Transit Authority to support vibrant economic growth for communities along the 16-mile light-rail line.

TechPort, a St. Mary’s County business incubator, will be managed by UMD.

The University of Maryland Extension conducted 1,535 consultations with farmers (2017) to solve production problems, raising their average profitability by $14,270. It also conducted 53,400 nutritional education consultations with Baltimore City youth.

The UMD-led Smart Cities Initiative, in collaboration with Morgan State University, the University of Baltimore, and the Johns Hopkins University, continues its work to bring high-tech improvements to West Baltimore in safety, engagement, accessibility and quality of life, while using College Park as a testing ground for technologies.

Research in Service of the State
• Developing innovative water treatment system to clean the Port of Baltimore.
• Applying cascading pools that trap runoff to help restore the Chesapeake Bay.
• Identifying a new wave of complex street drugs.
• Improving evacuation planning for floods in Baltimore metropolitan areas (with Morgan State University).
• Assessing feasibility of Autonomous Technology Center in Western Maryland.
From viticulture, aquaculture and crops to drones, small business and first responders, UMD’s impact reaches every county in Maryland.