2013 Legislative Testimony

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President

University of Maryland, Baltimore County
February/March 2013

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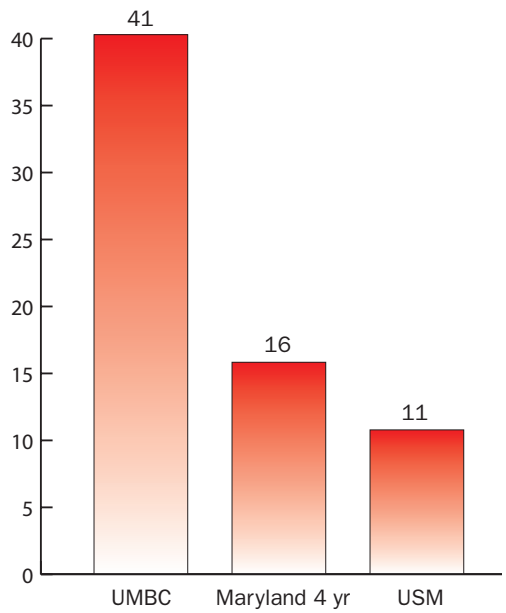
- The State of the University
- Summary of FY 2014 Budget Request
- Response to Legislative Analyst's Comments

UMBC
AN HONORS UNIVERSITY IN MARYLAND

KEY INDICATORS

Figure 1 Percentage of Bachelor's Degrees in STEM (Science, Technology, Engineering & Math)



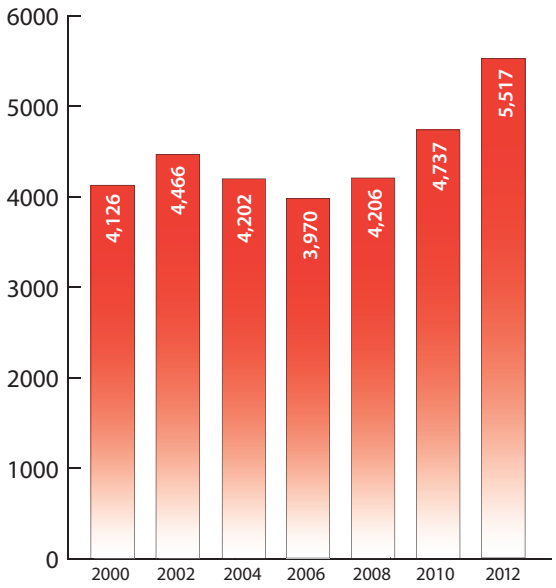
Source: IPEDS Peer Analysis System - Completions, 2011.
Prepared by UMBC OIR, February 2013.

STEM Degrees

UMBC has a higher percentage of science, technology, engineering and math (STEM) bachelor's degree recipients (41%) than any other institution in Maryland, with the exception of the Naval Academy. Science-and-technology programs are the most expensive to support in order to provide students with the most up-to-date resources. For example, according to the National Center for Education Statistics (NCES), the cost of a bachelor's degree in biological sciences is 86 percent higher than the cost of a bachelor's degree in English.

(Source: NCES: A Study of Higher Education Instructional Expenditures: The Delaware Study of Instructional Costs and Productivity, 2003)

Figure 2 UMBC Undergraduate STEM Enrollment Fall 2000 - Fall 2012

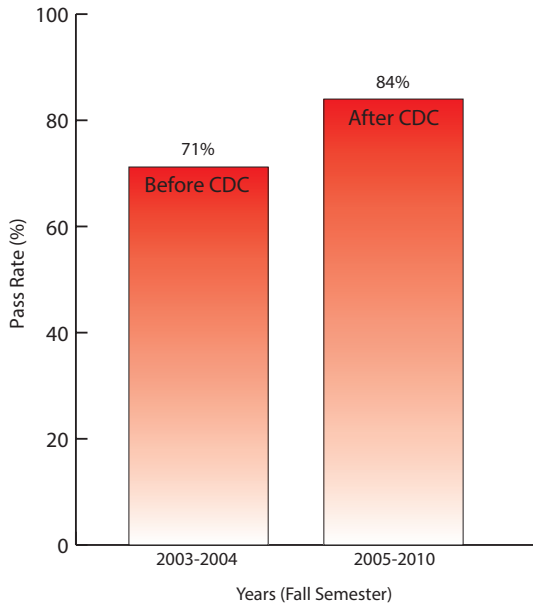


Source: UMBC OIR, Rex-Student Term Table

UMBC Undergraduate STEM Enrollment

During the past five years, undergraduate headcount enrollment has increased by 25 percent, outpacing overall enrollment growth of 12 percent in the same period. Our low level of funding per student and high enrollment in costly STEM majors require us to be conservative in setting enrollments in these high-demand fields.

Figure 3 Chemistry 101 Pass Rates

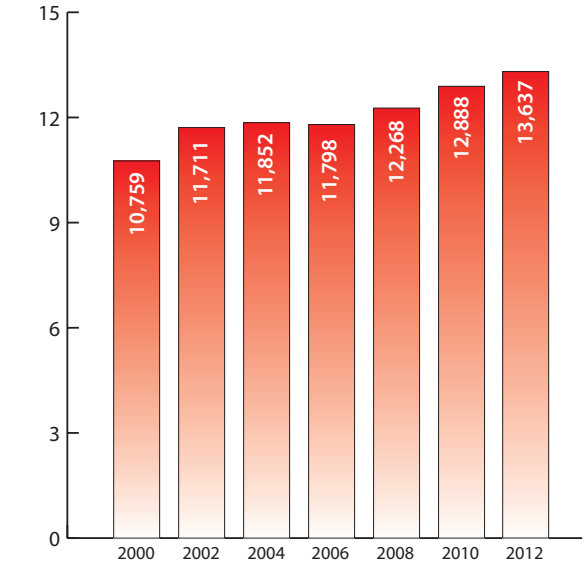


Source: UMBC Chemistry Discovery Center

Chemistry 101 Student Success

After redesign of the introductory Chemistry course to include active learning techniques, the percentage of students passing with a grade of "C" or better increased from the low 70s to the mid 80s. Thirty-five faculty members across the campus have received course redesign grants from the University System of Maryland to extend this work, and active learning is now being implemented in a wide range of other courses in psychology, mathematics, mechanical engineering, physics, biology, chemistry, sociology, and English.

Figure 4 Headcount Enrollment Fall 2000 – Fall 2012



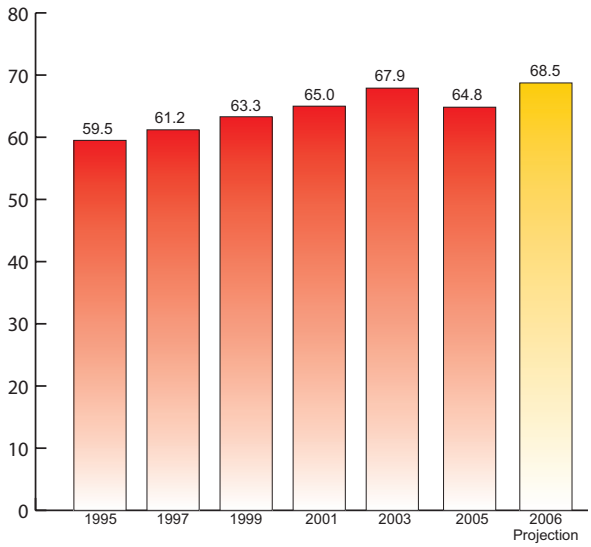
Source: UMBC Office of Institutional Research

Enrollment

Since 2000, headcount enrollment has increased 26.7 percent (10,759 to 13,637), increasing the need for faculty and staff, classrooms, lab space, housing, and library resources. Our current (FY 2013) FTE enrollment is 11,082, up 313 above FY 2012.

Our student body is among the most diverse in the nation, including 17.3 percent Asian, 15.6 percent African American, and 8.1 percent Hispanic and Native American students.

Figure 5 **Percent of First-time, Full-time Freshmen Graduating in Six Years (Cohorts Entering 1995-2005)**



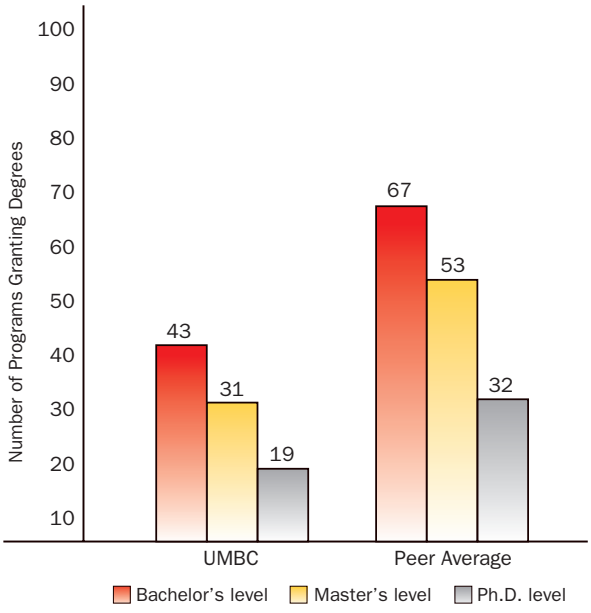
Source: MHEC Retention and Graduation Rate Reports and UMBC OIR, February 2013

Graduation Rate

Student graduation rates increased significantly during the past decade. Sixty-five percent of first-time, full-time freshmen entering UMBC in 2005 completed bachelor's degrees at UMBC or another Maryland institution within six years, compared to 59.5 percent of the freshman cohort entering in 1995.

In addition, National Student Clearinghouse data indicate that UMBC's six-year graduation rate is **75.4 percent**, reflecting all fall 2005 full-time freshmen who graduated from any U.S. college or university. In addition, 13.8 percent of this cohort is still enrolled at higher education institutions.

Figure 6 **Bachelor's, Master's, and Ph.D. Programs UMBC and Peers 2011**



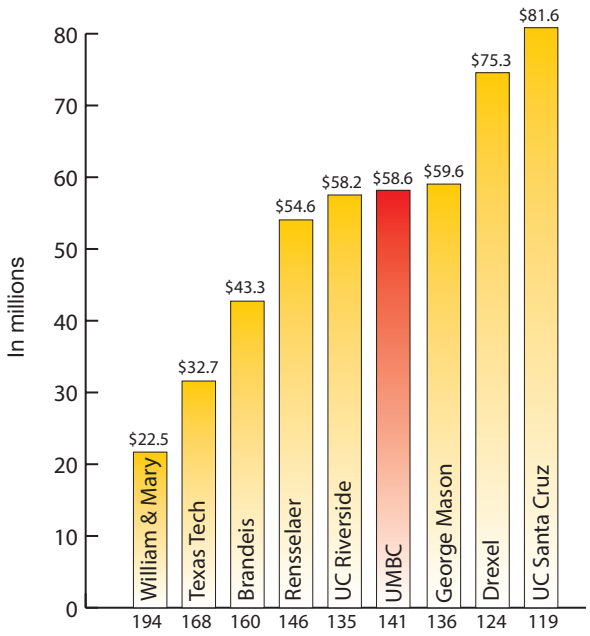
Source: IPEDS Peer Analysis System - Completions, 2011. U.S. Department of Education (Most recent data available.)

Narrow Program Base

UMBC offers a much smaller number of programs at all levels than its peers. More than 50 percent of our undergraduate students select science and technology programs, which are costly to deliver.

The addition of select, high-demand programs will enhance campus efficiency, retention and graduation rates, and future enrollment growth.

Figure 7 Federal R&D Expenditures 2010

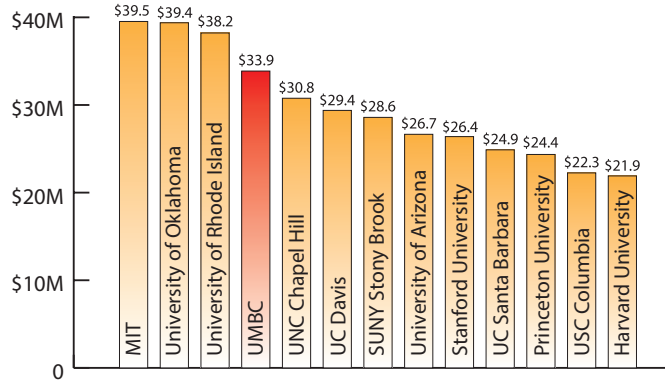


Source: The Higher Education Research & Development Survey (HERD)

Federal R&D Rank

UMBC's ranking by the National Science Foundation for Federal R&D expenditures for science and engineering rose from 200 in 1996 to 141 in 2010 (out of more than 700 institutions ranked). This dramatic rise is especially impressive given that most other nationally ranked institutions are substantially larger and older (and often include medical centers).

Figure 8 Environmental Science Research Expenditures FY2010

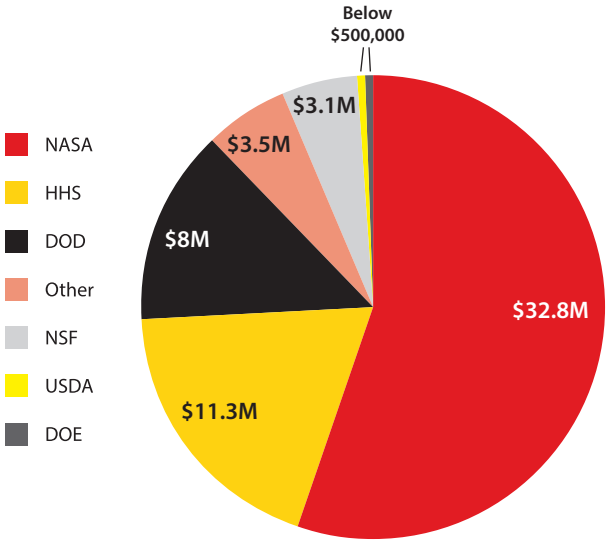


Source: The Higher Education Research & Development Survey (HERD)

Environmental Research

The campus ranks 18th nationally in environmental science research and development expenditures in the most recent national survey available. Research collaborations spanning science, engineering, geography, public policy, and the arts are yielding new knowledge about the global environment and its effects on health, safety, and the economy.

Figure 9 Federal Research Expenditures FY2010



Source: The Higher Education Research & Development Survey (HERD)

Sources of Federal Research Funding

The National Science Foundation reports that UMBC ranks 60th in Federal R&D expenditures among universities without medical schools. In FY2010, NASA was the largest source of Federal support for faculty research at $32.8M, followed by the Department of Health and Human Services ($11.3M) and the Department of Defense ($8M).

LEGISLATIVE TESTIMONY
Freeman A. Hrabowski, III, President
University of Maryland, Baltimore County (UMBC)
February-March, 2013

INTRODUCTION: INVESTING IN MARYLAND

As Maryland and the nation continue to build momentum for economic recovery and growth, my students, colleagues, and I are grateful to the General Assembly and Governor for your strong support of public higher education in general, and of UMBC in particular, as we stay focused on building capacity and quality. With your help, we have continued to invest in student success and in faculty and staff productivity, developing brainpower and discoveries that drive innovation and economic momentum in Maryland and beyond.

As a growing research university focused on national distinction and quality, UMBC strongly endorses the University System of Maryland (USM) strategic plan's goals of increasing college completion and enhancing research and economic competitiveness. Between fiscal years 2011 and 2012, UMBC made significant strides in degrees awarded, increasing the number of bachelor's degrees awarded by 12% and the number of master's degrees and post-baccalaureate certificates awarded by 4% and 20% respectively. We have aggressively implemented teaching innovation across the campus, in gateway science courses, Psychology, English, and Sociology. We have also established a partnership with four community colleges, funded by a $2.6-million grant from the Bill and Melinda Gates Foundation, to support the success of transfer students pursuing bachelor's degrees in science, technology, engineering, and mathematics (STEM). UMBC is consistently classified as a university with high research activity by the Carnegie Foundation and is a national leader in environmental science and cybersecurity. We are continuing to build basic research capacity and are attracting new faculty through the development of shared core research facilities (including jointly establishing with UMB a functional magnetic resonance imaging facility), and our technology commercialization activities have accelerated, with the number of companies served by our research and technology park growing from 70 to more than 100 since FY 2011, and license agreements tripling from FY 2011 to FY 2012. As State investment in these priorities grows, we are prepared to continue to increase the number of graduates, support expanded research capacity, and strengthen technology transfer capability.

My colleagues and I are delighted that for the first time in five years, the Governor's proposed budget for the USM includes increased programmatic funds that would enable us to continue to build enrollments, increase student success and completion, and invest in infrastructure for research and technology commercialization. In addition, the Governor's proposed budget would enable campuses to hold in-state, undergraduate tuition increases to a modest 3%, helping to preserve Maryland's position as a national leader in keeping college affordable.

We are especially appreciative that the Governor's capital budget proposal includes $35.2 million to complete construction of the second and final phase of our Performing Arts and Humanities Building and places our Interdisciplinary Life Sciences Facility in the capital budget plan for FY 2016. The first phase of the Performing Arts and Humanities Building, which opened this past September, includes classrooms, writing labs, a 275-seat main theater, a 100-seat black box theater, and our Dresher Center for the Humanities. Your action to advance Phase-2 construction funding to FY 2013 allowed our campus to maximize efficiencies and jobs by retaining the construction team already in place. Phase 2, scheduled to be complete in July

2014, will include classrooms and lecture halls critical for keeping up with enrollment growth, as well as music technology labs, dance studios, and a 350-seat Concert Hall. Because many general education courses in the arts and humanities will be taught in the additional classrooms, nearly every undergraduate student will benefit from this new facility.

USM's emphasis on effectiveness and efficiency has resulted in our maximizing the use of State funds and relying on a variety of accountability measures. We recognize and appreciate that higher education in Maryland has been far better supported than higher education systems in most other states. Our campus takes stewardship of the State's investment seriously. We have continued to build enrollment while carefully managing costs and focusing investments on four institutional priorities: student success; infrastructure for research and creative achievement; environmental issues; and campus safety and security. Since FY 2006, the campus has achieved $30.4 million in savings and cost reduction through the USM Effectiveness and Efficiency process. Recently, this has included achieving $2.2 million in annual energy cost savings, securing more than $3.3 million in capital investments from our food service vendor, saving more than $2 million through competitive contracts, and attracting $2.5 million from private sources for marketing, publications, and IT equipment.

As we continue working to maximize the resources available to support our students, we must also acknowledge that our campus is stretched. Between FY2000 and FY 2013, UMBC had the lowest funding guideline attainment level of any USM traditional, four-year campus for six years during those years and tied for the lowest level in two of those years. Also during this period, UMBC had the lowest average funding guideline attainment of all USM institutions. During the past five years, our undergraduate headcount enrollment in STEM programs has increased 25%, outpacing overall enrollment growth of 12% for the same period. Our relatively low level of funding per student and high enrollment in costly STEM majors require us to be especially cautious in setting enrollments in these high-demand fields. Further, a shortage of needed science and engineering research facilities challenges our capacity to compete for federal research grants, and we have deferred facilities maintenance and repair projects, increasing a backlog of work that now totals more than $80 million. As UMBC approaches its 50th anniversary, many of the academic buildings in the central core of our campus are due for major facilities renewal, with estimated costs ranging from $32 million to $85 million per building.

As the Governor and the Legislature have made a strong commitment to moderating undergraduate, in-state tuition, the campus has continued to support families and students facing financial pressures. We have been active in identifying student jobs on campus (slightly more than 2,100 students work on campus, not including graduate assistants) and connecting students with part-time employment in the region related to their majors. We also have increased our institutional need-based financial aid pool by 23% this year, and offer families payment plans and extended payment options. Finally, we have engaged in entrepreneurial activities to generate revenue, including corporate training courses, additional grant writing to national agencies and private foundations, and fundraising from individuals, foundations, and corporations.

Because of our fiscal challenges, we have had to be even more focused on our core priorities, including protecting the academic program and supporting students, faculty, and staff. Our Student Government Association Senate once again approved a Resolution of Appreciation of the UMBC Faculty and Staff stating that "while UMBC continues to face financial challenges…UMBC has maintained an unprecedented quality education for all its students." Most important, even during difficult times, we have continued to move forward. I am delighted to report to you on UMBC's progress and to respond to questions you may have regarding our FY 2013 and FY 2014 budgets.

OUR VISION:
Academic Excellence, Economic Development, and Social Vitality

UMBC is a public research university, emphasizing graduate programs in the sciences, engineering, public policy, and human services, and building on a strong undergraduate liberal arts and sciences core. We stand out among the nation's research universities because of our emphasis on undergraduate education, reflecting our tradition of linking research and teaching, coupled with our bold vision and entrepreneurial spirit. We also stand out increasingly as a model of academic innovation and inclusive excellence. It is an amazing story that we have come so far so fast, in just under 50 years. Your investment in us has generated a high return for the State, and we are determined to continue attracting and educating growing numbers of students who will enter Maryland's workforce and reflect the diversity of our State.

This past fall, my colleagues and students were excited and proud to be recognized for the fourth year in a row as America's #1 "Up-and-Coming" national university by *U.S. News & World Report.* The *U.S. News* rankings also placed us on a list of universities whose faculty demonstrate "unusual commitment to undergraduate teaching," along with Duke, the University of California – Berkeley, the University of Chicago, and Notre Dame. *Times Higher Education* (of London) named UMBC to its top 100 universities in the world under 50 years old, a ranking that showcases institutions that do not have centuries of history but are rising stars. *The Princeton Review* again identified us as one of the nation's "Best Value" universities. Also, Kiplinger's included us on its list of "Top 100 Best Values in Public Colleges 2012-2013" based on academic quality and affordable education. *The Chronicle of Higher Education* again recognized the campus as a "Great Place to Work," a distinction based on surveys of faculty and staff. Finally, the prominent television news magazine "60 Minutes" ran a feature on the University, calling UMBC, "one of America's most innovative colleges."

We have become a national model for preparing students of all backgrounds in science and engineering, including minorities and women, at a time when the nation is focusing on strengthening its position in the global economy and America's demographic profile is shifting dramatically. A recent National Academies report cites UMBC as a national leader in preparing underrepresented minorities for careers in the natural sciences and engineering. The Congressionally mandated report notes that UMBC is among the top U.S. institutions – and is the top producer among predominantly white institutions – in preparing African American undergraduates who go on to complete Ph.D.s in these fields. We also are recognized increasingly as a major resource for both building the State's economy and addressing its social concerns. We foster economic development through research and training contracts and grants; technology development, including the activities of *bwtech*@UMBC Research and Technology Park; partnerships involving continuing education and business outreach; and workforce development. We are engaged in addressing urgent social needs through courses incorporating civic engagement, service, entrepreneurship, and outreach activities as well as K-12 outreach initiatives and additional programs supporting at-risk youth.

We now enroll nearly 13,650 students (including approximately 10,950 undergraduates and 2,700 graduate students), and we have approximately 1,900 full-time and 554 part-time faculty and staff positions. Our FY 2013 operating budget is $370 million, including almost $87 million annually in external funding for research and training. Nearly 60,000 alumni, three-quarters of whom live and work in Maryland, contribute to the State's and nation's economic and social vitality. We offer bachelor's and selected master's and Ph.D. programs in the physical and life sciences, social and behavioral sciences, engineering, mathematics, information technology, education, the humanities, and visual and performing arts.

We are experiencing considerable growth at The Universities at Shady Grove, where we offer undergraduate programs in social work, psychology, political science, management of aging services, and history, and graduate degrees in industrial and organizational psychology and geographic information systems. We are very pleased to be extending biotechnology and cybersecurity programs to Shady Grove to enhance workforce development in Montgomery County. Over the past decade UMBC has experienced more than 12% growth in our Shady Grove enrollments, and we expect our programs to continue to grow at a pace of approximately 3% per year for the next five years. As a result, we are planning to add additional undergraduate and graduate programs in STEM fields at Shady Grove over the next decade.

Brainpower and talent are constantly fueling discoveries and innovation on campus, and increasingly we are building on these strengths in collaborations with others. UMBC's Center for Hybrid Multicore Productivity Research is the hub of an NSF-supported Industry/University Cooperative Research Center that aims to help the United States be more competitive in world markets by streamlining the research-to-industry process. This initiative, which focuses on the next generation of high-performance and cloud-computing technology has attracted partners including the University of California-San Diego, IBM, NASA, the National Oceanic & Atmospheric Administration, Lockheed Martin, Northrop Grumman Information Systems, and Deloitte.

According to the Higher Education Research & Development Survey, the campus ranks 18th nationally in environmental science research and development expenditures. We recently launched the Goddard Planetary Heliophysics Institute (GPHI) through a Cooperative Agreement with the NASA Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. Based at GSFC, GPHI is a center for collaborative research in solar-planetary sciences linking researchers from UMBC, the University of Maryland, College Park, and American University. The Institute focuses on phenomena ranging from solar wind to sunspots, including the effects that weather on the Sun can have on Earth and our orbiting satellites.

The recent realignment of the former University of Maryland Biotechnology Institute faculty has brought many new scientific and technology-development assets to UMBC. Maryland Sustainable Mariculture (MSM), a spin-off company founded by UMBC marine biotechnology faculty, is currently negotiating with a group of international investors who plan to lease space at the Columbus Center in downtown Baltimore to model marine aquaculture in a public display. Plasmonix, a biotechnology start-up based on technologies licensed from the Institute of Fluorescence, recently received venture capital from the Governor's "Invest Maryland Challenge" and is now located at *bwtech*@UMBC*,* our research and technology park. In addition, our core facilities in mass spectrometry, imaging, and high-performance computing support both faculty research and companies. We work aggressively to create multi-level partnerships that connect faculty and students with companies, agencies, foundations, and school systems – and these partnerships enable us to leverage State funds. For example, we have developed major research centers and other partnerships with support from NASA and from IBM, Lockheed Martin, Northrop Grumman, SAIC, Wyeth Pharmaceuticals, the Department of Defense, the National Security Agency (NSA), and other organizations. Other partnerships with Federal and State agencies have allowed us to leverage State funds and contribute to the policy arena in gerontology (through the Erickson School for Aging, Management, and Policy and the Center for Aging Studies), the environment (through our Center for Urban Environmental Research & Education – CUERE), health care (through our Hilltop Institute), and teacher education (through the Center for History Education, the Center for Excellence in STEM Education, and the Maryland Geographic Alliance).

Our campus, located just 10 miles from the home of the U.S. Cyber Command at Fort Meade, supports Maryland's development as a cybersecurity hub by offering resources including degree programs, professional training, faculty researchers, and technology transfer activities.

Our Center for Cybersecurity connects students and professors from multiple fields (computer science, engineering, public policy, mathematics, and physics) with an interest in advancing academic, research, workforce development, and technology incubation activities. UMBC is one of the few universities in the United States designated as a Center of Academic Excellence in both Information Assurance Education and Research by the National Security Agency and the Department of Homeland Security. Faculty researchers are leading a six-university team on a $7.5-million, five-year Assured Information Sharing Lifecycle grant from the U.S. Department of Defense. The UMBC group, collaborating with colleagues from Purdue and the Universities of Illinois, Michigan, and Texas, is working to translate recommendations by the 9-11 Commission for more effectively sharing classified information into an effective, secure technology network. UMBC also supports commercialization of security technologies in such fields as situational awareness and sensors at our cybersecurity business incubator, Cync*@bwtech*. And NSA's Advanced Computing Systems Research Program is currently leasing 11,000 SF at *bwtech@*UMBC*,* where they are working to develop technologies to help meet the government's future computational needs. Northrop Grumman Corporation recently made a $1-million grant to our Center for Women in Technology (CWIT) to support the new "UMBC Cyber Scholars" program. The program will recruit 15 to 20 top STEM scholars per year and involve them in cybersecurity. This past year, UMBC Training Centers opened a new state-of-the art training facility in Columbia, near Fort Meade. With more than 12,000 square feet of classrooms, technical labs, and offices, the new center serves as a regional hub for collaboration and education in areas including cybersecurity, computer science, innovation, and organizational effectiveness. Finally, UMBC is a founding sponsor of the Maryland Cyber Challenge, a competition and conference for high-school and college students and professionals seeking to develop their skills and build careers in Maryland's growing cybersecurity industry.

The Alex. Brown Center for Entrepreneurship prepares students for successful employment (as both entrepreneurs and intrapreneurs) in Maryland. Working with UMBC faculty, the Center has developed or modified 74 courses across all campus colleges and schools to include an entrepreneurial emphasis, and nearly 5,000 students representing 40 different majors participated in these courses this past year. We also recently launched an interdisciplinary minor in Entrepreneurship and Innovation. Further, a new First Year Seminar entitled "Creativity, Innovation, and Invention" resulted in a student start-up named "Banana Bones," a geolocation mapping application designed to help UMBC students navigate the campus and local businesses.

We also continue to build on the success of ACTiVATE, our applied training program for women seeking to become technology entrepreneurs. During its five-year tenure at UMBC (2005-2010), the program trained approximately 100 women, including 65 with minority backgrounds, and launched more than 25 companies built on technology developed on Maryland campuses and in Federal labs. The ACTiVATE brand was licensed by UMBC to the Path Forward Center for Innovation and Entrepreneurship, which now offers the program in Columbia and Northern Virginia and has licensed the program to a group in Dearborn, Michigan. INNOVATE, a spin-off program developed in partnership with Johns Hopkins University to provide graduate students with entrepreneurial skills, recently completed the third and final year of its $600,000 NSF grant after training 59 M.D./Ph.D., Ph.D., M.D., M.B.A., and J.D. students, including 45 minority students. In all, 15 new companies were formed through INNOVATE, and we are currently planning to offer the program at the Universities at Shady Grove later this year.

In the area of social entrepreneurship, UMBC has launched a collaborative, campus-wide civic engagement initiative, *BreakingGround*, which enables students to address real-world needs through 14 courses in areas ranging from American Studies to Mechanical Engineering. The initiative aims to help students envision their careers as opportunities to have a public

impact, reflecting the responsibility of higher education institutions to play a central role in strengthening American democracy and preparing citizens to tackle the challenges of our age.

THE STATE OF THE UNIVERSITY: FACING CHALLENGES FROM A POSITION OF STRENGTH

Our current strengths reflect the efforts and commitment of State leaders, our faculty, staff, and students, and years of careful thinking, ambitious planning, hard decisions, and strong support from the University System, Board of Regents, and our Board of Visitors. We have managed for results, and the State's investment and confidence in us have yielded solid returns.

We continue our rapid development as a major research university. In fact, based on the latest comparative national data (2010), NSF ranks UMBC 141st among 2,800 four-year institutions in the United States for federally funded research expenditures. This is especially significant because most other nationally ranked institutions are substantially larger and older and often include medical centers. (NSF ranks UMBC 60th in the nation for research expenditures among campuses without medical schools.) It is significant that our sponsored contracts and grants grew to $94 million in FY 2010, up from $20.2 million in FY2000. (Our contract and grant totals in FY 2011 and FY 2012, $83 million and $78 million, respectively, reflect both the conclusion of a major, long-term NASA grant for our Goddard Earth Sciences & Technology Center, GEST, and the increasingly competitive environment for federally sponsored research given the nation's continuing economic challenges.) Regarding enrollments, since 2000, the number of full-time-equivalent students increased from nearly 8,730 to 11,362 (30%); total degrees conferred per year increased from approximately 1,800 to 2,818 (57%); and the number of students living on campus increased 60% from 2,350 to 3,754 – including almost three-quarters of our freshmen and nearly half of our full-time undergraduate population.

We also have developed special scholars programs for honors students in the humanities, arts, education, and public policy, reflecting our strengths in these areas. In fact, we are among a relatively small number of colleges and universities with a Phi Beta Kappa chapter, reflecting our strengths in the liberal arts. We also are one of only two public campuses in Maryland with a Howard Hughes Medical Institute Investigator and have twice received the *U.S. Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring.* Further, we are among a small number of universities to have received both a multi-million-dollar NSF ADVANCE grant, in recognition of our strengths in preparing women in science and engineering, and a major grant through NSF's Alliances for Graduate Education and the Professoriate (AGEP) program to prepare more minority Ph.D.s in science. UMBC is also one of only 21 institutions selected to participate in the Council of Graduate Schools Doctoral Initiative on Minority Attrition and Completion (CGS DIMAC) program, which helps underrepresented minority graduate students locate faculty appointments after completing their doctoral studies.

Our strengths and our success, especially during this period of constrained resources, have also created challenges related to meeting the needs of students for more full-time faculty, more instructional space, additional sections (in programs ranging from biochemistry to mechanical engineering), and more support services. Moreover, while we have been successful in attracting increasing grant support, lack of research space hampers our ability to compete successfully for even more contracts and grants. We also need additional scholarship funding to support our students, particularly in the areas of science and engineering and teacher preparation in math and science.

THE UMBC COMMUNITY: QUALITY, ACHIEVEMENTS, CONTRIBUTIONS

STUDENTS

Our student body is among the most diverse nationally (41% minority, including 17% Asian, 16% African American, 5% Hispanic and Native American, and 3% two or more races). The full-time freshman class of 1,560 students includes hundreds of valedictorians and 4.0 GPA students, reflecting our attractiveness to high-achieving students and the success of our Honors College and special scholars programs—Linehan Artist, Sondheim Public Affairs, Sherman Teacher, Meyerhoff, Humanities, Cyber, and Center for Women in Technology Scholars programs.

The graduate population of nearly 2,700 students includes increased numbers of domestic students (83% of our graduate enrollment), women (50%), and underrepresented minorities (24%). Our doctoral enrollments remain strong, and we continue to attract large numbers of working professionals to master's programs responsive to the growing needs of businesses, school systems, and other employers.

Our fall 2012 total headcount enrollment of nearly 13,640 has contributed to an annual FTE enrollment of 11,082 in FY2013, which is 313 above our total FTE enrollment in FY2012 (10,769) and 113 above our budgeted FTE enrollment in FY 2013 (10,969). Among our challenges in continuing to build enrollment are UMBC's relatively small program base and higher out-of-state tuition costs. The campus's aggressive response to these challenges has resulted in our exceeding projected enrollments the past several years, and dramatic increases in applications. In fact, we have received more than 1,000 additional applications for new freshman admission than we did a year ago – an increase of 17% – while in-state applications are up 28.4%.

Higher retention rates also contribute to strong enrollments. Following substantial gains in freshman-to-sophomore retention during the past decade, retention continues to progress. Our overall freshman-to-sophomore-year retention rate (2011 to 2012) for full-time freshmen was 85.1% compared to 81.7% in fall 2004. In addition, our overall fall-to-spring semester freshman retention rate increased from 91.9% (fall 2005 to spring 2006) to 94.3% (fall 2011 to spring 2012). A recent analysis of student success using National Student Clearinghouse data indicates that nearly three-quarters of all new, full-time freshmen who entered UMBC in fall 2005 had graduated from UMBC or another four-year institution six years later and nearly 14% are still pursuing degrees.

Rising retention rates are the result of a multi-year, campus-wide effort focusing on student success and retention that is redefining education to meet the learning needs of contemporary students. Redesigning foundation courses that previously relied on large lecture formats is at the heart of these efforts. In fall 2005, the Chemistry 101 course was redesigned to include weekly, hands-on discovery learning sessions in which teams of students work collaboratively to solve problems together. This active learning innovation increased both retention of students in the chemistry major and the percentage of students passing this essential gateway course with a "C" or better. From this foundation, course redesign for active learning has expanded beyond chemistry to psychology, mathematics, mechanical engineering, physics, biology, sociology, and English. As a result of this success, the campus is currently in the process of redesigning introductory courses in English, math, and sociology, as well as junior level courses in chemistry. This past academic year the CASTLE (College of Natural & Mathematical Sciences Active Science Teaching & Learning Environment) facility hosted 1,454 students taking one of ten redesigned introductory science and math courses. In addition, the College of Natural & Mathematical Sciences has recently entered into an agreement with the Howard Hughes Medical Institute (HHMI) to construct the first active learning wet laboratory on

campus. The use of the facility will be shared and serve UMBC students during the academic year and host HHMI Science Education Alliance programs during the summer months. HHMI will be investing $1.7 million to design, construct, and equip the facility. Further, 35 faculty members in the departments of Sociology/Anthropology, English, Psychology, and Chemistry have been awarded course redesign grants by the University System of Maryland.

Strong transfer student enrollment also has contributed substantially to enrollment growth and prompted even greater efforts to support success in this group. We are intensely focused on the success of STEM transfer students and recently joined with community colleges in Montgomery, Anne Arundel, Howard, and Baltimore Counties and the Bill and Melinda Gates Foundation to establish the STEM Transfer Student Success Initiative. Over the next three years, with a grant of $2.6 million from Gates, UMBC and our community college partners will create pathways for transfer students planning to major in STEM at UMBC. This effort includes curricular and programmatic alignment and a comprehensive student-support infrastructure to make the transition as welcoming and smooth as possible for students. A STEM Transfer Success Toolkit will be widely disseminated to enable other institutions to undertake similar endeavors. Over the next five years, as many as 1,000 students in Maryland could benefit from this program.

In graduate education, we are one of 29 universities (e.g., Cornell, Duke, UCLA, UNC-Chapel Hill, Yale) to receive funding from the Council of Graduate Schools' Ph.D. Completion Project. UMBC is among the leading research universities in the U.S. in the production of IT degrees at the undergraduate, master's, and Ph.D. levels and is consistently among the top producers of public policy Ph.D.s.

Finally, we are particularly proud of the recent creation of the Retriever Learning Center (RLC) in partnership with and investment from our Student Government Association. This 24-hour, card-access space on the ground floor of the Albin O. Kuhn Library is designed specifically for group study and interactive learning. Equipped with white boards, large monitor computer screens, and comfortable seating, the RLC is an innovative and highly utilized learning environment.

Student Scholarship, Achievement, and Intellectual Competition

Providing undergraduates with wide-ranging opportunities for research, creative achievement, and intellectual and athletic competition both on and off campus is a vital part of our culture. As a result, the student body routinely includes distinguished student scholars. The class of 2012 was yet another example of this student success. For example, Class of 2012 Valedictorian Mary Elizabeth Cole, a Humanities Scholar, double majored in cultural anthropology and biology, conducted research at the National Institutes of Health, and conducted archeological work at colonial and prehistoric American Indian sites in southern Maryland. She is now a fully funded doctoral student in biological anthropology at The Ohio State University. In addition, recent graduates Robert Douglass Wardlow and Patrice Starck, were invited to attend the annual Nobel Laureates Meeting in Lindau, Germany. They were two of only 500 young researchers selected to exchange ideas with Laureates and other leading scientists at the conference, and this marks the third year in a row that UMBC student scholars have attended the prestigious gathering. Six UMBC students received NSF Graduate Fellowships in fields ranging from mechanical engineering to mathematics, allowing them to study at such institutions as Carnegie Mellon, the University of Michigan, and Rice University. For three out of the past four years, UMBC students have been among the finalists in the *Gates Cambridge*, *Marshall*, and *Rhodes* scholarship competitions, an unusual accomplishment for a university of our size and age. In the past three years, UMBC has had six *National Security Education Boren* scholarship winners and 11 *Fulbright* scholarship winners, with a record five *Fulbrights* in 2012. We also

have seven *Fulbright* finalists for the coming academic year and one finalist for the Jack Kent Cooke Graduate Arts Award. Other recent distinguished student scholars have included *HHMI Gilliam* and *Institute for International Public Policy Fellows*, and *Goldwater*, *Byrd*, *NSA*, *Blaustein*, *Irene Ryan Acting*, and *U.S. State Department Critical Language Scholars.*

Once again, our theater students were invited to participate in the finals of the Kennedy Center's American College Theatre Festival. Our student productions have been among the most frequently invited (seven times), and our recent production of *Las Meninas* was one of only four finalists nationwide. Also, a team of undergraduate and graduate mechanical engineering students placed 3rd overall out of 253 teams in the Society of Automotive Engineers' Mini-Baja vehicle competition, capturing judges' attention in such categories as design, maneuverability, and cost. In intercollegiate athletics, for the second time in three years, our men's soccer team captured an America East title and advanced to the second round of the NCAA Tournament. UMBC was ranked 28th in the final *2012 College Soccer News* national poll and was listed in the top 25 in the nation in attendance in 2011 and 2012. Lacrosse alumni Brendan Mundorf, Drew Westervelt, and Peet Poillon earned Major League Lacrosse All-Star recognition in the summers of 2011 and 2012. In addition, Baseball team captain Curtis Schickner ('12) was named Vice Chair of the NCAA's Student-Athlete Advisory Committee. Volleyball player Iman Kennedy and basketball player Michelle Kurowski were among 10 national finalists for the prestigious *Arthur Ashe, Jr. Sports Scholar Award* in 2012. Overall, our student-athletes perform extremely well academically. In fact, in fall 2012, more than half had grade point averages of 3.0 or higher, including 26 with 4.0s and 92 with 3.5 or higher. And our chess team continues to draw international attention, now holding a record 10 Pan-American Intercollegiate Team Chess Championship titles (including a first place tie in December 2012). The team now advances to the President's Cup (the "Final Four of Chess") this coming April, a competition UMBC has won a record six times.

Responsive Program Initiatives

Although UMBC has a narrow program base in comparison to its institutional peers, we have introduced a small number of programs in recent years that are responsive to student and market demands. Since 2011, we have implemented several new programs of study including a Bachelor of Arts and an Upper Division Certificate in Asian Studies; a Bachelor of Fine Arts in Design; a Post-Baccalaureate Certificate in Music Entrepreneurship; an Upper Division Certificate in Management Accounting; a Master of Arts in Language, Literacy and Culture; and a Master of Arts in Texts, Technologies, and Literature.

In the past few years, a number of early-stage UMBC programs have made exciting progress. We are continuing to develop critically needed technology leaders through our Cybersecurity Master of Professional Studies (M.P.S.) Program, which currently enrolls more than 140 students. Launched in 2010 with input and advice from industry advisors, this program attracts young and mid-career professionals and provides them with operationally focused technical and non-technical cybersecurity education and training, along with the necessary "soft skills" needed to use this knowledge effectively in the workplace. Other M.P.S. programs supporting workforce development include programs in biotechnology, geographic information systems, and industrial/ organizational psychology. Also, a new Public Health track in our Health Administration & Policy program has grown rapidly since its inception.

Now in its fifth year, the bachelor's program in Media and Communication Studies represents an exciting, interdisciplinary response to the need for citizens, generally, and the workforce, in particular, to be able to communicate across a range of media and cultural contexts. The program has graduated more than 150 students, and majors have had internships at

The Baltimore Sun, The Maryland Lottery, Northrop Grumman, and WYPR, while graduates have gone on to work for WEAA, the Maryland Science Center, and Xerox.

Gender and Women's Studies, an interdisciplinary program emphasizing historical, cross-cultural, and international perspectives and critically examining issues of gender, class, race, ethnicity, sexual orientation, age, and ability, has shown continued growth since our last report. Currently, students in this discipline are working in collaboration with the American Association of University Women to address the gender-wage gap by offering salary negotiation workshops for all UMBC students.

UMBC's Games, Animation, and Interactive Media (GAIM) Program builds teams of students with arts and computer science backgrounds to learn real-world, industry-ready skills in video game design. The resulting experience can be applied to careers in Maryland's gaming sector or the computer graphics, aerospace, architecture, and healthcare fields, among others. The Baltimore/Washington region is among the nation's leaders in the number of computer game companies, and employers are recruiting talented programmers and artists to meet demand.

Well-Prepared Graduates

Producing well-prepared graduates for Maryland's workforce is one of our most important and lasting contributions to economic development. Thousands of physicians, attorneys, teachers, scientists, engineers, IT workers, policy-makers, social workers, artists, and other professionals are among UMBC alumni living and working in the State. NSA, for example, employs hundreds of our math, computer science, and language graduates, and we were their top provider of STEM talent in 2012. The campus will continue producing large numbers of graduates in these and other areas responsive to Maryland's and the nation's workforce needs, e.g., cybersecurity, biotechnology, health care, and the environment. Many of these graduates will be active in business start-ups and work in local entrepreneurial ventures. Our graduates contribute directly to the quality and supply of the State's workforce, two of the most critical factors in relocation decisions by companies.

We are encouraged by the impressive number of companies making recruiting visits to campus and the number of seniors receiving offers from such companies and organizations as Northrop Grumman, Booz Allen Hamilton, Kennedy Krieger Institute, Johns Hopkins University and Johns Hopkins Applied Physics Laboratory, National Institutes of Health, the United States Army, Centers for Medicare and Medicaid Services, and the Maryland Department of Health & Mental Hygiene. In addition to the regular career services we provide for students (one-to-one counseling, career workshops and programs), we also host a spring Career Week, which brings hundreds of employers and dozens of UMBC alumni to campus to help students identify their career paths and hone their job search skills.

The Governor's Summer Internship Program and the Walter Sondheim Jr. Maryland Nonprofit Leadership Program – facilitated through partnerships involving UMBC's Shriver Center, the Governor's Office, and the Maryland Association of Nonprofit Organizations – each provides 20 students attending Maryland institutions the chance to work on substantive government or nonprofit projects, attend site visits and seminars, and interact with senior leaders in paid, 10-week internships. In addition, the Shriver Center facilitates UMBC's Shattuck Family Internship Program for Entrepreneurship Innovation and Social Change. This paid, semester-long internship experience gives 20 UMBC students with entrepreneurial spirit the chance to see what it takes to launch for-profit or social ventures.

Our Erickson School, highlighted in the *Wall Street Journal* and *Washington Post*, is the first professional school in the nation to integrate the study of business management, public policy, and human aging. We are grateful for the State's start-up support several years ago, which matched a $5-million gift from the School's founding donor, John Erickson. Increasing

numbers of undergraduate and graduate students are finding the Erickson School's distinctive, interdisciplinary curriculum an attractive alternative to traditional business degrees. Courses in our undergraduate Aging Services program have attracted more than 1,100 students this academic year, up from 730 students the previous year. The School's Executive Education program now offers a variety of professional development courses, including an annual Baby Boomer Aging Summit and the Assisted Living Federation of America's Leadership Institute, both attracting professionals from around the country. Master's degree recipients range from the CEO of Broadmead Retirement Community in Baltimore County to the CEO of the Alzheimer's Association of Greater Maryland. We have just admitted our sixth cohort of students from across the nation, and will graduate our 100th master's program student in May. Many of the graduates are already making a difference in the lives of older adults and changing the way society thinks about aging.

Finally, the Meyerhoff Scholarship Program, now in its 24th year, is a national model for preparing high-achieving students from all backgrounds in science and engineering and increasing the numbers of underrepresented minorities pursuing research careers in these fields. Hundreds of program graduates, many of whom have completed Ph.D., M.D./Ph.D., M.D., or M.S. degrees, are serving in faculty and post-doctoral research positions at universities throughout the country – from Harvard to Hopkins and Duke – or working as researchers in companies ranging from Wyeth Pharmaceuticals and Becton Dickinson to Rohm & Haas. The Meyerhoff model is now being replicated by such institutions as the University of North Carolina at Chapel Hill, Cornell University, Winthrop University (SC), and Penn State University.

FACULTY

UMBC has 497 State-supported full-time faculty members who teach and conduct research, 167 full-time research faculty funded from contracts and grants, and 306 part-time faculty. They are dedicated to their students and their work, and our full-time instructional faculty are accountable through a rigorous process of review for promotion and tenure. Because of our emphasis on hands-on experiences for students, faculty connect with students not only through teaching, but also in their research. These experiences lead to substantive faculty-student interaction in labs, studios, and other settings, and to student internships.

Awards & Recognition

Another measure of the quality of our faculty is their success in competing for such major prestigious awards as *Fulbright*, *Guggenheim*, *NSF CAREER*, and *Howard Hughes Medical Institute (HHMI) Investigator* awards. Professor Eric Dyer of Visual Arts and Writer-in-Residence Lia Purpura of English are Guggenheim Fellows this year. Biochemist Michael Summers, who leads a research team of undergraduates, graduate students, and post-doctoral fellows mapping the structure of HIV and related retroviruses, is in his fourth, five-year term as an HHMI Investigator. He is one of only two HHMI Investigators at a public university in Maryland. UMBC historian Anne Rubin is serving as President of the Society of Civil War Historians, while fellow historian Denise Meringolo won this year's National Council on Public History's *Book Award*. And physics professor Ray Hoff was recently awarded NASA's *Distinguished Public Service Medal*. A number of other UMBC faculty in recent years, representing a variety of fields, have become *Fulbright Scholars*, *NIH Presidential Early Career Award* winners, *IBM Faculty Award* and *IBM Innovation Award* winners, *MSDE Outstanding Change Agent Award* recipients, and fellows of the Mellon Foundation, National Endowment for the Arts, National Endowment for the Humanities, American Association for the Advancement of Science, Woodrow Wilson National Fellowship Foundation, U.S. Department of State

Jefferson Science Program, American Council of Learned Societies, Huntington Library, Institute of Electrical & Electronics Engineers, American Physical Society, American Statistical Society, Optical Society of America, American Meteorological Society, and American Institute for Medical & Biological Engineering.

UMBC also is playing a leadership role in helping to increase the numbers of women and minority faculty. Building on support received several years ago from NSF's ADVANCE program, for example, we now have 42 women faculty members in STEM fields. We also now have 28 African-American and 16 Latino faculty members and an active diversity initiative to increase those numbers. In addition, the head of our Center for Advanced Studies in Photonics Research (a physicist) and the Dean of the Graduate School (an electrical engineer) are both African Americans. UMBC has also established a Postdoctoral Fellowship for Faculty Diversity, which supports early-career scholars committed to diversity and prepares them for possible UMBC tenure-track appointments. From the first cohort of fellows, we have already hired Dr. Viviana MacManus, who is a Latina, for a tenure-track position in Gender and Women's Studies.

As State support for higher education has fluctuated over the years as the result of changes in the economy, faculty hiring also has fluctuated and has not been commensurate with enrollment increases, new programs, and institutional plans and aspirations. The size and quality of UMBC's faculty will largely determine our level of success as a research university for many years. As the budget permits, we must continue to hire superb faculty to meet enrollment shifts, replace retiring faculty, and replace faculty we lose to other universities and corporations with whom we compete intensely. It is important not only to build our faculty complement, but also to retain faculty by providing the necessary support structure for research, teaching, and competitive salaries. Faculty drive the campus's research enterprise, attracting revenue-generating grants and contracts, creating research opportunities for graduate and undergraduate students, and developing new knowledge and innovations leading to technology transfer. Retaining faculty is important also because of the costs associated with replacing them.

Research

We help anticipate and shape the future by producing new knowledge through our faculty's research – either individually or through partnerships with corporations or public agencies. The authors of *The Top American Research Universities,* a report from The Lombardi Program measuring university performance (2004), state that research institutions change very slowly over time; yet their data on Federal research expenditures show that among research universities in the nation, UMBC's rise has been extraordinary. Faculty members also publish cutting-edge books and articles across the academic spectrum and produce wide-ranging creative achievements in the arts.

Our research is important, in part, not only because it addresses scientific, technological, and public-policy issues facing society, but also because it gives our undergraduate and graduate students opportunities to work with us on these issues – from AIDS and cybersecurity to Medicaid policies and the K-12 academic achievement gap. The latest book by Psychology Professor Robert Provine, *Curious Behavior: Yawning, Laughing, Hiccupping, and Beyond*, was recently published by Harvard University Press and draws from extensive research conducted by undergraduates in his lab. Provine's method of studying human behavior through observation allows him to provide students substantive research experience. Undergraduates have joined him as co-authors of journal articles included in the textbooks used in their classes.

Investigating the environment is a strong and growing part of our research enterprise, with faculty continuing to apply new knowledge about environmental science and policy to advance health, safety, and the economy. Faculty research in the geosciences, for example, was

ranked third nationally in recent years by *Science Watch* for citation impact (the number of times peer professors cite UMBC faculty work in their own research papers). According to *Science Watch*, the only U.S. universities with more frequently cited research on the environment, water, soil, atmosphere, pollution, and climate change were Harvard and Georgia Tech. Scientists in our Marine Biotechnology Department recently completed a license agreement with EuroPharma LLC for a technology that induces sterility in farm-raised salmon to prevent them from breeding with wild salmon, thus stopping the farm-raised fish from "genetically disrupting" wild salmon populations. And scientists with our Center for Urban Environmental Research and Education (CUERE) are studying pervious concrete, a building material designed to decrease the flow of storm water and pollutants into the Chesapeake Bay and other waterways. CUERE is also leading a multi-institution team that received a $5-million water sustainability grant from NSF – one of only three awarded nationally – to create a model of urban development focusing on water quality and supply. Our Joint Center for Earth Systems Technology (JCET) has had its Cooperative Agreement with NASA-Goddard's Earth Science Directorate renewed through 2014 with support totaling more than $18.6 million. JCET faculty not only conduct cutting-edge research but also teach undergraduate and graduate courses in physics, geography, mathematic, chemistry, computer science, and mechanical engineering. Also, the GLOBE (Global Learning & Observation to Benefit the Environment) Project, supported by a $1.8-million grant from NSF and focused on understanding the global impact of local changes in land use, is being conducted by an interdisciplinary team of UMBC faculty, postdoctoral researchers, and graduate and undergraduate students in the Departments of Geography & Environmental Systems, Computer Science & Electrical Engineering, and Information Systems in close collaboration with national and international global change research organizations. The campus also continues its collaboration with Princeton in one of just 15 NSF-supported Engineering Research Centers (ERC) in the nation. The ERC is developing technologies for ultra-sensitive chemical sensing using light, and the Center's work is expected to yield new products protecting public health and the environment. Our Hilltop Institute, which focuses on health policy research, conducts analysis and evaluation for State and Federal agencies, foundations, and other non-profit organizations, including a study this year to model Maryland's costs and savings associated with implementing healthcare reform. Other major research programs are being conducted by our HHMI Laboratory, Center for Advanced Sensor Technology, Center for History Education, Imaging Research Center, and the Maryland Institute for Policy Analysis & Research.

Faculty across the campus continue to be recognized as leaders in their fields, from economist Scott Farrow, who received a MacArthur Foundation grant to serve as Editor-in-Chief of the *Journal of Benefit-Cost Analysis*, and Rebecca Boehling, Professor of History and Director of the Dresher Center for the Humanities, who was selected to direct the International Tracing Service in Germany, which helps victims of Nazi persecution and their families determine the locations and fates of missing family members, to Maurice Berger, research professor and chief curator at the Center for Art Design & Visual Culture, who was recently nominated for an Emmy Award for his work as curator of *For All the World to See*, an exhibit of Civil Rights movement images that has been viewed by more than 750,000 visitors since it opened in 2010. The exhibit was selected by the National Endowment for the Humanities as the 10th *NEH on the Road* exhibition, an initiative that made it possible for the exhibit to travel to dozens of venues. The exhibit has received numerous awards, grants, and honors, including the "2010 Outstanding University Exhibition" from the Association of Art Museum Curators. Also, UMBC historians have a lengthy record of excellence in scholarly research and publication. This past decade the Department (with an average of only 16 full-time tenured and tenure-track faculty) has produced more than 50 books. Their publishers include many of the most prestigious university presses

(e.g., Oxford, Princeton, Harvard, University of North Carolina, University of Illinois, and Johns Hopkins).

PROFESSIONAL EDUCATION, TRAINING, and SERVICE

Consistent with our mission, we also serve as a center of professional development, working with agencies and business and industry in the Baltimore-Washington region. Some of our major partners include school systems in the Baltimore-Washington corridor, Lockheed Martin, Northrop Grumman, Science Applications International Corporation (SAIC), NSA, SSA, and DBED. Through our Division of Continuing & Professional Studies, we offer individuals and organizations customized credit and non-credit graduate, certificate, and training programs on campus, on-site, online, and at the Universities at Shady Grove in Rockville.

We are especially committed to graduating more students qualified to teach courses in STEM disciplines in Maryland schools. George and Betsy Sherman have pledged to UMBC a second $5-million gift in order to double enrollment in our Sherman STEM Teacher Scholars Program (which currently enrolls 50 students). The program works to increase the number of STEM graduates who move immediately to teaching careers in high-needs public schools. UMBC also recently received a $750,000 grant from the NSF Noyce Program to boost the number of graduates who become science and math teachers in high-needs middle and high schools. We also serve as the Statewide affiliate for two key MSDE STEM education initiatives aimed at generating excitement among K-12 students in STEM disciplines. The first initiative – *Project Lead the Way* – supports150 Maryland schools in teaching middle school and high school engineering courses, and UMBC provides a Professional Development Summer Training program for teachers to become proficient with the engineering curriculum. We also host the FIRST (For Inspiration & Recognition of Science & Technology) Lego League Competition, where more than 300 teams of middle schoolers from across Maryland match wits in hands-on, research-based competition using state-of the-art Robotic Lego kits. We partner with Northrop Grumman Corporation to sponsor the event and support creation of 15 new LEGO teams at middle schools serving low-income families in the greater Baltimore area. We have also introduced *Engineering is Elementary,* which teaches students about engineering and design, in Baltimore City, Baltimore County, and Howard County schools. Finally, with support from Constellation Energy, our Shriver Center partnered with UMBC's Physics Department and WeatherBug to introduce an innovative alternative energy curriculum to nearly 150 students at two local middle schools in Baltimore City and Howard County. Through the POWER (Partnership Organizing Wind Education & Research) initiative, WeatherBug generously outfitted the two schools with specialized equipment and software and trained students to gather weather-related data to inform their math and science curriculum. Seven UMBC STEM undergraduates implemented this curriculum over the spring semester and later presented a display of wind turbine kits assembled by the middle-school students during our Undergraduate Research and Creative Achievement Day.

Other examples of outreach in support of professional development include the MAE (Master of Arts in Education) Program offered to in-service teachers through partnerships with school systems in several counties, and the work of our Center for History Education, which has won approximately $8 million in grants from the U.S. Department of Education in conjunction with public school systems in Baltimore City, Anne Arundel, Baltimore, and Howard Counties to help strengthen history instruction in elementary, middle, and high schools. Over the past decade, the Center has worked with more than 700 teachers who have enrolled in graduate-level history education courses. We also have partnerships with Anne Arundel, Baltimore, Charles, Howard, and Queen Anne's County Public Schools to provide training programs for scores of

teachers in mathematics, science, English, and ESOL, and our Center for Art, Design & Visual Culture works with area schools to strengthen arts education for K-16 students.

Finally, the Shriver Center continues to provide applied experiences each year for more than 2,600 students through internships, co-ops, and community service positions in more than 700 organizations in the U.S. and abroad, including Science Applications International Corp. (SAIC), General Electric, Johns Hopkins University Applied Physics Lab, Booz Allen Hamilton, and Siemens Building Technologies. The Center has attracted millions of dollars in grants and contracts in recent years from national and State agencies and foundations, and is serving hundreds of at-risk youth daily through its nationally recognized Choice Program.

TECHNOLOGY DEVELOPMENT

Over the past 20 years, we have been a model for developing partnerships focused on technology development and commercialization, and our *bwtech*@UMBC Research and Technology Park supports these growing activities. *bwtech*@UMBC includes two sites providing space and services to more than 100 biotech, IT/engineering, and cybersecurity tenants: one site, adjoining the main campus, is a 41-acre research park housing companies spanning all stages of development; the second site, located just south of campus, is a 30-acre business incubator and accelerator housing start-up and emerging firms. The research park adjacent to campus is fully built out, with five major facilities containing more than a quarter-million square feet of space. Our business incubator and accelerator facility overlooks Interstate 95, just minutes from both our central campus and BWI Airport, and within view of tens-of-thousands of north- and southbound travelers daily. The site includes three buildings housing approximately 165,000 square feet of research, office, and conference facilities. Approximately two thirds of our tenants are early-stage firms employing hundreds of workers. For the incubator companies, we provide a variety of university resources, including low-cost office/lab space, shared administrative services, and access to UMBC's library and computing resources, faculty expertise, and business, legal, marketing, and technical advice. The General Assembly, DBED, and Baltimore County all strongly supported UMBC's efforts to acquire these facilities (originally a Martin Marietta Research lab site), an excellent example of our partnering with business and government in the interest of economic development and enhancing the region's quality of life.

Two recent initiatives at *bwtech*@UMBC are the Clean Energy Incubator, a partnership with the Maryland Clean Energy Center, and the Cyber Incubator, designed for early-stage companies focused on cybersecurity. The Cyber Incubator is located in a Class A office suite at *bwtech*@UMBC. In addition to the benefits associated with being located in a federal Small Business Administration HUBZone and state Enterprise Zone, Cyber Incubator clients have access to specialized business mentoring and support services tailored to the needs of tenants. In the two years that the Cyber Incubator has been in operation, it has grown to 30 companies; *bwtech*@UMBC also has 11 established cybersecurity companies at the Park.

Ellen Hemmerly, Executive Director of *bwtech*@UMBC, was recently named a 2013 Influential Marylander in Technology by *The Daily Record* for her work with the cybersecurity incubator. In addition, one of our cyber incubator companies is a finalist for the Most Innovative Technologies award presented at the RSA Security Conference. In 2012, *bwtech*@UMBC tenant Craig Stuart-Paul, CEO of Fiberight, LLC, was selected as the Entrepreneur of the Year at the Maryland Clean Energy Center's Energy Summit.

The number of direct jobs located in *bwtech*@UMBC facilities has grown from nearly 850 in 2007 to 1,100. Moreover, *bwtech@UMBC* emphasizes tenant interaction with faculty, staff, students, and alumni producing research collaborations, employment, and internships. Our Office of Technology Development works closely with tenant companies and faculty, pursuing strategies for commercializing faculty inventions and technology transfer designed to contribute

to economic development and garner new resources for the campus. A growing emphasis on identifying applied uses of faculty research and on faculty collaboration with industry has resulted in increased invention disclosures.

Success with our technology transfer efforts has also increased our licensing revenue over the past few years. For example, professors at our Center for Advanced Sensor Technology (CAST) recently completed a license agreement with General Electric for non-contact or non-invasive parameter sensing technologies to be used in the infant incubator and warmer field.

SUSTAINABILITY

Our campus community is working to address global warming every day. Through our research and academic programs, we are producing knowledge and a new generation of informed citizens and leaders to move Maryland and the nation toward dramatically reduced emissions of greenhouse gases. We are part of the American College & University Presidents' Climate Commitment. Our Climate Change Task Force has developed an action plan and is actively implementing projects to reduce our carbon footprint on campus and beyond. Through climate change initiatives, the campus has reduced its net emissions by 13.3% over the past five years, a major reduction considering the 15% increase in enrollment and 2% increase in campus square footage during this time period. The additional square footage includes a LEED Gold Certified addition to Patapsco Residence Hall, complete with our campus's first green roof, as well as Phase 1 of our new Performing Arts and Humanities Building built to LEED Silver standards.

As of 2012, 20% of UMBC's electricity comes from renewable resources, utilizing our long-term contract with the University System of Maryland. A Chilled Water Optimization project significantly improves the efficiency of the Central Plant and cooling for most of the campus, reducing annual energy usage by 5,700,000 kWh and reducing annual Greenhouse Gas emissions by 3,100 metric tons eCO2. Relative to a baseline year of 2007, this represents a 7% reduction in electricity and 3.5% reduction in carbon footprint.

UMBC hired its first full-time Environmental Sustainability Coordinator in 2012, and the Student Government Association is funding five sustainability interns this year through its "green fee." Student participation in a new composting program and in Recyclemania, a 10-week national competition involving 400 colleges and universities, has boosted the campus's recycling rate to 28%. The university has also made significant advances in green transportation initiatives, including optimizing UMBC transit service routes and schedules, a new carpooling policy, improved vanpooling and public transit options, and improvements to make the campus more bike- and pedestrian-friendly.

PRIVATE GIVING

In September 2006, we announced a $100-million capital campaign, a goal we recently surpassed, raising more than $115 million. Our current endowment totals approximately $60 million (up slightly more than $2 million over a year ago), and reflects a dramatic increase over time. In FY 1996, our endowment totaled only $3.6 million. Major gifts by corporations, foundations, alumni, faculty, and staff have built endowment support for student scholarships, faculty research, endowed professorships, faculty and staff development, and other programmatic initiatives ranging from the sciences and engineering to teacher preparation, the arts, and community service. These successes are especially notable given the national decline in alumni giving to public universities documented over the past several years. In fact, through the first six months of the current fiscal year, UMBC has secured $15.3 million in gifts and pledges, surpassing our FY-2013 target for total giving.

The campus has strategically invested in alumni communications and fundraising initiatives in an effort to build a solid core of donors for the future. The *UMBC Magazine*, for example, was launched in 2009, now reaches almost 60,000 graduates to update them on university events, priorities, and people. Similarly the UMBC Alumni Blog and the Giving Blog provide online tools to help build alumni pride and celebrate and acknowledge alumni donors. In FY 2012, we reallocated annual fund resources and built a state-of-the-art phonathon-calling center. The impact has been significant. In the call center's first year, we experienced an eight-percent increase in alumni participation, and we are projecting a 12% year-over-year increase this current fiscal year, as well as an increase in alumni dollars. We have also experienced increased alumni donor retention (nearly 60% in FY 2013), alumni donor fulfillment (76% in FY 2012, above industry average), and new alumni donor acquisition (first-time donors accounted for almost 20% of our FY-2012 alumni donors).

Further, with a major grant from the Carnegie Corporation of New York, we launched our new *Academic Innovation Fund*, and in January of this year made initial competitive awards to faculty for dynamic teaching and learning initiatives that support undergraduate and graduate student success. Specifically, the grants enable faculty to redesign courses or other learning experiences, develop innovative course and/or curriculum development projects, and/or conduct research into the effectiveness of existing instructional strategies. And as a result of a recent fundraising campaign by our Foundation, we have received nearly $3.5 million in gifts and pledges to endow this special fund. The first of these awards were granted to faculty members in January of 2013.

I also want to note my colleagues' and students' strong commitment to charitable giving to help those less fortunate through the Maryland Charity Campaign. This past year, our faculty, staff, and students made more than 1,035 gifts to the campaign, totaling nearly $200,000. We take great pride in having created a strong culture of charitable giving.

SUMMARY OF FY 2014 BUDGET REQUEST

Operating Budget

UMBC's FY 2014 budget request of $382.4 million includes an increase of $7.1 million in State funding and a $3.4-million increase in tuition and fees. The FY 2014 funding increase will support the university's mandatory expenses, such as full-year funding of the FY 2013 mid-year COLA, a fourth-quarter merit increase, increases in fringe benefits, additional need-based financial aid, and dedicated funding to address our facilities renewal backlog.

A total of $3.3 million in our budget request, including more than $900,000 from our fund balance, will support our efforts to increase college completion rates, grow STEM enrollment and degrees granted, provide support for transfer students, and increase commercialization of research and technology transfer. This funding will make it possible for us to meet institutional requirements in areas of highest STEM enrollment growth. We will be able to expand our dynamic Gates partnership with community colleges in Anne Arundel, Baltimore, Howard, and Montgomery Counties. These funds will improve services to our growing student population through more need-based aid and additional course redesign across all disciplines, including STEM and gateway courses. These additional funds will also allow us to continue our efforts to commercialize intellectual property and expand our expertise in technology transfer.

Capital Budget

UMBC's FY 2014 budget request of $37.2 million includes $35.2 million to complete construction of Phase 2 of our Performing Arts & Humanities Building. Completion of this

facility will provide space to meet the current and future instructional, research, and student-life needs of the UMBC community by housing the Departments of Theater, Music, Dance, Ancient Studies, English, and Philosophy. The new facility will transform the delivery of the arts and humanities programs and enrich the lives of our students, and of other members of the campus community.

The remaining $2 million of our budget request will support the design and construction of the Campus Traffic Safety and Circulation Improvements project. The reconfiguration of our main campus entrance will alleviate serious traffic flow challenges while protecting the safety of drivers, pedestrians, and bicyclists.

We are grateful to the Governor and the General Assembly for their continued support of UMBCs capital requests. The new Interdisciplinary Life Sciences Building, with proposed FY 2016 design funding, will seamlessly connect teaching and research activities to enhance and further stimulate collaborative approaches to advancing the State's biotechnology industry and increasing the number of STEM graduates.

RESPONSES to LEGISLATIVE ANALYSTS'S COMMENTS on UMBC

OPERATING BUDGET & PERFORMANCE ANALYSIS

Education & Related Expenditures Per Degree

. **Page 9:** ***As shown in the performance measures, student performance and outcomes peaked in fiscal 2007 and have since declined. Additionally, according to the Complete College America data, it took a student in the 2008-09 academic year, on average, 4.63 years to graduate. The President should comment on the factors leading to the increase in performance in 2007 and why this level had not been maintained in the subsequent years.***

Campus Response

UMBC continues to target its resources on efforts to raise retention and graduation rates, resulting in improved performance when viewed in the long-term. The 2007 cohort represents a random variation among the cohorts included in the analysis. Trends in second- and third-year retention rates show the progress we have made over time, and we have seen continuing increases in these rates the past two years and believe this trend is likely to continue.

It is important to note that the figure (Exhibit 3, page 8) showing undergraduate degrees per 100 full-time equivalent students reflects only minor variation (between 1% and 2%) in any given year. The seven-year trend, though, is positive. Similarly, the expenditures per degree completed (Exhibit 4, page 9) are overall on a downward trend, which also is positive.

We are committed to increasing four- and six-year graduation rates, and we anticipate that many of the strategies described below will yield success. Because UMBC is hampered by its relatively narrow academic program base, and is unable to offer a number of degree programs that are quite popular with students, comparisons to peers that offer such degree programs invariably show a gap.

While not an exhaustive list, the following set of examples reflects key efforts underway at UMBC to increase retention and graduation rates, and overall student success:

. First Year Seminars (including Transfer Student Seminars): These small, highly interactive academic courses enable new freshmen and transfers to develop strong relationships with faculty.

. Living Learning Communities: Students with a common interest live together, while sharing and developing their interests.

. Collegiate Success Institute: Incoming freshmen find community, resources, and support throughout their first year, including a summer bridge program and co-curricular activities.

. First Year Intervention: This systematic, early-warning system helps students find the help they need early in the semester when intervention is most effective.

. Learning Resources Center, Tutoring, Supplemental Instruction: We provide these resources to help students in particular academic areas, both when they encounter academic difficulty and when they wish to improve an already solid grade.

. Course Redesign – With great success, we have been redesigning introductory and gateway courses to improve student learning and outcomes. In fact, we are attracting national attention for our efforts.

. Special Scholars Programs: These programs in the arts, humanities, social sciences, and STEM build academic community and supports for high-achieving students, contributing to very high graduation rates and successful post-graduate experiences.

Proposed Budget

. **Page 11:** ***The President should comment on UMBC's involvement with MPowering, the formal alliance between the University of Maryland, Baltimore and the University of Maryland, College Park, and with the Maryland Innovation Initiative, in particular, the plans to hire a site miner.***

Campus Response

UMBC is not one of the two institutions directly involved in MPowering at this time. However, we do coordinate closely with both UMB and UMCP in several areas, including the collaboratively operated Institute for Marine and Environmental Technology (IMET) in Baltimore, which has as part of its mission furthering technology transfer by the partnering institutions. UMBC's research and technology transfer activities, similar to those of UMB, UMCP, and UMCES, align with, and contribute heavily to, the innovation and technology transfer goals of the USM Board of Regents' Committee on Economic Development and Technology Transfer. The Board has made clear through Systemwide tech transfer goals and metrics, that it anticipates greater cross-institutional collaboration and activity—including efforts represented by MPowering and IMET—and UMBC is supportive of and engaged in these efforts.

The Maryland Innovation Initiative (MII) was created as a partnership between the State of Maryland and five Maryland academic research institutions: UMB, UMCP, UMBC, Johns Hopkins University, and Morgan State University. The program is designed to promote commercialization of research conducted in the partnering universities and to leverage each institution's strengths. MII facilitates technology transfer from university labs to start-up companies and boosts economic development in Maryland. The MII program has a $5.8-million budget for FY 2013.

The idea for MII was fueled by the fact that while Maryland ranks first nationally in Federal R&D awards per capita, first in University research, and third in R&D intensity, it ranks 37th in technology transfer. To address this gap, the Maryland Innovation Initiative seeks to change the culture by working aggressively to turn research opportunities into companies of their own.

To date, MII has two main programs – the Innovation Discovery and Innovation Commercialization Programs. Universities participating in MII are expected to make an investment (cash contribution) to be eligible for the two programs. In MII's first year, UMBC

contributed $100,000 to the initiative, and has been a full participant in the development and implementation of the two programs.

The Innovation Discovery Program is designed to help participating universities engage "Site Miners," who will be technology commercialization experts responsible for identifying promising technologies and fostering collaborations across departments, schools, and institutions to maximize the commercial potential of Maryland's scientific discoveries. Universities can apply to recover a portion of their investment (up to 50%) to offset the costs associated with Site Miners. Site Miners are individuals with deep content knowledge about the areas of research in which institutions are especially strong, and who also have experience with technology commercialization, technology licensing, and/or venture creation. UMBC has engaged one Site Miner for approximately 1.5 days per week with significant expertise in research and entrepreneurial experience in the life sciences and chemical and biochemical engineering. We are seeking a second Site Miner who can collaborate with and support faculty in the IT/Engineering disciplines at UMBC.

The Innovation Commercialization Program will provide funding through a competitive process to support commercialization of university technologies at three stages: pre-commercial translational research; commercialization planning; and early-stage product development. Awards are made monthly for proposals that demonstrate a high likelihood of commercialization.

UMBC has just received funding for its first proposal from this program. Dr. Mark Marten, in our College of Information Technology & Engineering, has been awarded a grant for $100,000 to develop an antimicrobial "cocktail" able to replace traditional antibiotics used in poultry feed. This concept was developed by MycoInnovation, a company Marten launched this past December and that is located in the bwtech@UMBC incubator space. This product has the potential to promote animal production efficiency, increase food safety, improve animal health, and maximize poultry growers' profits. We expect that that UMBC faculty will continue to participate successfully in the Innovation Commercialization Program.

Institutional Aid

. **Page 14:** ***The President should comment on the relatively modest amount of institutional aid going to need-based aid, the decline in expenditures on need-based aid in fiscal 2012, and on the proportion of institutional aid going to those students in the unknown category.***

Campus Response

In response to the USM Task Force on Financial Aid issued in FY 2006, UMBC made a commitment to increase its need-based aid budget by a minimum of 5% over any tuition rate increase. Even in the face of challenging budgets in recent years, we have met or exceeded that commitment, as reflected by the following annual increases in need-based aid:

FY 2007	+26%
FY 2008	+10%
FY 2009	+10%
FY 2010	+ 5%
FY 2011	+13%
FY 2012	+11%
FY 2013	+23%

The spike in spending for FY 2011 was the result of an unusual increase in the retention of financial aid recipients from fall 2010 to spring 2011. Although the budget was lower than the level of the expenditures that year, we honored the commitments to the students who had already received awards. Given budget constraints, the additional funds allocated that year to meet these commitments could not be sustained at that level. UMBC expects to continue the strategy of increasing the budget for need-based aid above any tuition rate increase in order to provide greater support for our neediest students.

The proportion of institutional aid going to those students in the unknown category continues to decrease as funding to our neediest students has increased. In FY 2012, 43.9% of awards went to those in the unknown category, compared to 55.7% in FY 2007. This trend will continue as need-based aid increases.

STEM Transfer Student Success Initiative

. **Page 18:** ***The President should comment on the status of the programs being created under this initiative. Given that part of the initiative is to better align curricula, the President should also discuss if the articulation agreements are working as intended so that credits earned at the community college transfer in full.***

Campus Response

UMBC continues working closely with our four community college partners in Anne Arundel, Baltimore, Howard, and Montgomery Counties to enhance the success of STEM transfer students. Following a year of collaborative planning (2011-12) involving all of the campuses, we received a major three-year implementation grant from the Bill and Melinda Gates Foundation. Over the next three years, our team will implement a national model for comprehensive STEM transfer student success based on our collective planning. The model has two primary components: (1) the inter-institutional team is focusing on the academic resources and networks that transfer students bring with them to campus, so that we build on their strengths rather than taking a remedial approach once they come to the university; (2) building on our successful efforts to align community college course work in Chemistry, we are expanding curriculum alignment in mathematics between UMBC and our partner campuses. These efforts are expected to inform changes that may be needed in articulation agreements with our community college partners, to assure that credits earned at the community colleges will transfer in full.

Three major mechanisms that have been shown to increase the success of STEM transfers are being piloted:

. Comprehensive advising will take place while students are still at the community colleges. This will include both online and face-to-face advising and involve both academic and career advisement.

. Innovative seminars at both the community colleges and the university will focus on disciplinary content, helping students learn how to find academic resources at the community colleges and UMBC, and student success strategies.

. Peer Alumni at the Community College (PACC) will involve current UMBC students who have transferred from local community colleges working with students both at

community colleges and when they arrive at the university. We also are creating both an online tool to help transfer students find student organizations at UMBC compatible with the ones at the community colleges, and an online welcome center providing streamlined resources and information for transfer students.

While we are early into this initiative, preliminary findings are very encouraging. Fall 2011 was the first semester UMBC offered seminars specifically tailored for transfer students. These seminars were continued in fall 2012. The retention rate was greater than 90% for students participating in these seminars, compared to the fall 2011 retention rate of 88% for all full-time transfer students. Also, a self-assessment by 58 transfer students in fall 2012 (22 of whom were STEM majors) showed that the transfer students felt much more comfortable about directing a study group, preparing an annotated bibliography, locating key offices, identifying opportunities for tutoring and academic assistance, and writing a resume. We expect to see continuing improvement in transfer student retention and success, especially among STEM transfer students, as we fully implement the strategies and practices included in this initiative.

We also recognize the critical importance of articulation in supporting a smooth transition to campus by Maryland community college transfer students. We are committed to maintaining and updating ARTYS, USM's Articulation System, which is an online database that offers both course-by-course equivalencies and Recommended Transfer Programs, i.e., a two-year course of study for each major area of study offered at UMBC. By following this recommended course of study, community college students can effectively prepare for transferring to UMBC.

In addition, UMBC's Articulation Work Group – with representatives from each college, the Office of Undergraduate Education, Enrollment Management, Undergraduate Admissions, and the Registrar's Office – works to develop program-to-program articulation agreements to facilitate community college students' academic planning and transition from the associate degree to the baccalaureate degree. Formal agreements exist between UMBC and two-year partner institutions involving programs in STEM, the arts, humanities, and social sciences. It is clear that our attention to articulation with community colleges and their students is creating an increasingly transfer-friendly environment at UMBC and growing transfer enrollments.

iCubed

. **Page 19:** ***The President should comment on the findings of the project and which interventions show the most promise to increase student success in STEM programs and would be the most cost effective to scaling up.***

Campus Response

iCubed (Innovation through Institutional Integration) presents a unique opportunity for eligible first-year students at UMBC who are pursing STEM majors. This NSF grant-funded study is examining the relative effectiveness of four successful intervention strategies developed at UMBC for STEM students that are now employed successfully by several high-cost scholarship programs on the campus. The purpose of the study is to determine which interventions can be successful and cost-effective when scaled up to benefit large numbers of future first-year STEM students.

The *iCubed* study employs a random controlled trial of interventions and requires more than 1,000 student participants in order to be able to make meaningful and quantitative comparisons about the effectiveness of each intervention. Preliminary analysis of data collected thus far lacks sufficient statistical power to be able to draw conclusions at this point about the relative success of each intervention (though development of community among students appears to be an important factor). We also are conducting rigorous analysis of the costs of implementing each intervention. In addition to resource requirements, of particular interest are the cost benefits of increasing the success of students in STEM fields as measured by retention and graduation rates.

Once we have achieved a critical mass of participants, we look forward to being able to identify both (1) those interventions that show the most promise for students' academic success, and (2) the cost-effectiveness of scaling up the interventions.

Audit Findings

. **Page 20:** ***The President should comment on the status on resolving the findings from the audit.***

Campus Response

The USM Office of Internal Audit conducted its standard six-month follow-up to this OLA audit. It determined that we have implemented all but one of the eight findings. UMBC has undertaken corrective action on all eight of the audit findings. Seven of the findings have been resolved. Key actions taken by UMBC to address the audit findings include the following:

- Required retraining for all P-card approvers.
- Established additional analytical procedures to identify proactively possible compliance issues.
- Modified administrative systems to correct a number of identified problems.
- Created new reports and associated business processes to improve exceptions monitoring.

One finding related to grant receivable balances is being addressed through an extensive review of all such receivables. This review will conclude no later than June 30, 2013, at which time this finding will also be resolved.