

## MSU: Investing in Knowledge to Create Jobs for Michigan

non-government agencies, as well as government agencies. These students with advanced degrees are also prepared well for a life of learning.

Graduate students completing their programs have **in-depth content knowledge in a disciplinary field or sub-field, knowledge and skills required by licensing or accrediting bodies to become a practitioner, and, in the case of the Ph.D. student, the training for and completion of independent research/scholarship** that is an original contribution to the body of knowledge in a disciplinary or

interdisciplinary field. Graduate students not only have a commitment to life-long learning, they embody that characteristic, and they are also **prepared to share their knowledge as teachers.**

Michigan State University enrolls some 3,000 doctoral students, 5,000 master's degree students, and 1,400 graduate/professional students in a typical year. Currently enrolled graduate students range in age from 21 to 65 and **come from every state in the United States and from 130 other countries.**

### Spotlight on Success

An MSU degree will continue to increase in value. Graduates are ready for jobs in today's workplace and are instilled with the lifelong learning skills they'll need to survive and to thrive in tomorrow's.

"Your college career is as much about learning how to learn as it is actually acquiring knowledge. You extract what's important from each experience, because you will build upon that knowledge in the future."

— Mike McDonald,  
New Business Development,  
The Dow Chemical Company

MICHIGAN STATE  
UNIVERSITY

Advancing Knowledge.  
Transforming Lives.

MSU is an affirmative action, equal-opportunity institution

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## Outcomes for Michigan's Future

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### Overview:

#### *The Twenty-First Century Land-Grant Mission*

Michigan stands at a crossroads today. There is much work to be done, but budgets are strained. More than ever, it is essential that every precious dollar be put to work on behalf of the people of Michigan in ways that will bring them the greatest value and return — ways that will strengthen our communities, fuel our economy and provide all of our citizens with a better quality of life.

The case for investing those precious dollars in the work we do at Michigan State University couldn't be stronger.

In a very real sense, current circumstances mirror those of the old adage: You don't eat your seed corn. After a harvest, we address the needs we have today, but we also put something aside to address the needs we'll have tomorrow. Properly cultivated, that seed corn we put aside will yield many times the quantity that we plant.

Michigan faces many competing needs for funding. The question facing us is: Do we simply try to address as many as possible of those immediate needs with the limited resources we have at hand, or do we also invest a portion of those resources in people and in research and put those dollars to work building and improving our collective future?

Since 1855, Michigan State University has been building Michigan's future, preparing our citizens with the leading-edge knowledge they need to survive and thrive in a rapidly changing world — in a very real sense to be citizen leaders.

Graduates from MSU plant biology programs don't just work as biotechs, they create the labs. Graduates from MSU's College of Education don't just teach, they write the textbooks and are the master teachers who prepare the next generation of faculty and innovators. MSU's nation-leading Study Abroad

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programs don't just put students in classrooms overseas, they offer students real-world experiences and prepare them to work in multicultural, international organizations.

The challenge today is to ramp up Michigan's ability to seize a share of the emerging knowledge economy that will drive economic development in these early years of the twenty-first century. But a knowledge economy is not built on the skills of workers alone. The work of a land-grant university like MSU as a *creator* of the knowledge leads to the development of the innovations, the new technologies, and the new businesses that provide jobs for these workers.

Think of homogenized milk. Think of hybrid corn that has fed billions around the world. Think of the anti-cancer drug, Cisplatin, which helped keep Lance Armstrong alive. Now imagine the next set of discoveries and advances and the impact they can have on your life and the lives of our citizens and stakeholders. Because that's the work of a land-grant university.

You can't privatize the public good. As your land-grant university, Michigan State has a presence in every county and every community in the state. Each day as we go about our work — teaching, research, and service — advancing the public good of the citizens of those Michigan communities remains foremost among our goals.

### *MSU: Today's Work; Tomorrow's Results*

**MSU boosts Michigan's agricultural economy:** Agriculture at MSU goes beyond the traditional model of production agriculture and uses agricultural products for new purposes like alternative fuels and composite materials. MSU Extension, the Michigan Agricultural Experiment Station, the Michigan Department of Agriculture, and Michigan Farm Bureau are partners in Project GREEN (Generating Research and Extension to meet Economic and Environmental Needs) to boost the state's economy by **expanding plant-based agriculture and processing systems with emphasis on integrated crop management, preserving the quality of the environment; and ensuring the safety of the food supply.**

**MSU safeguards Michigan's food supply:** MSU's National Center for Food Safety and Toxicology is at the leading edge of research to make our food supply safer and to enhance homeland security. The Diagnostic Center for Population and Animal Health positions world-class veterinarians and scientists to protect Michigan's \$1.4 billion livestock industry by **identifying and eradicating diseases that potentially could threaten the safety of our food supply.**

**MSU addresses a statewide shortage of doctors and nurses:** Physicians tend to remain in areas where they complete their residencies. MSU plans to expand its

medical school to the Grand Rapids area to better serve the western side of the state. And partnerships with Lansing-area hospitals are working to hire more nurses, recruit more specialists, and enhance the education of newly graduated doctors. Since 1990, 379 physicians who graduated from MSU's two medical schools have established practices within the tri-county area of Clinton, Eaton, and Ingham counties. Some **55–60 percent of Human Medicine grads and more than two-thirds of Osteopathic Medicine grads stay in Michigan post-residency.**

**Bringing physicians to Michigan from other states:** The College of Osteopathic Medicine's Statewide Campus System (a network of 22 hospital partners) trains 1,048 interns and residents in 27 specialty programs across the state. More than **680 osteopathic physicians who graduated from medical schools outside the state are currently training in Michigan** through the Statewide Campus System.

**Preparing underrepresented populations for health care careers:** The Center of Excellence (COE) in Medical Education and Health coordinates programs and activities designed to increase the number and quality of underrepresented students, graduates, and faculty at the College of Human Medicine. For example, the Health Professions Achievement Pathway

**MSU serves the citizens of Michigan:** Ninety percent of MSU's **undergraduates are residents of the state.** In addition, MSU spends more of its operating budget (60 percent) on our core missions of instruction, research, and public service than any other public Big Ten institution except the University of Wisconsin.

**MSU graduates live and work in Michigan:** Alumni data indicates that a majority of MSU graduates — nearly 6 out of 10 — live and work in Michigan. In the most recent survey (2000–01), **76 percent of MSU bachelors' graduates remained in Michigan, 65 percent of MSU master's graduates remained in Michigan and 39 percent of MSU doctoral/professional graduates remained in Michigan.** Many of the latter teach at our regional universities and community colleges.

**MSU prepares students to work in multicultural, international environments:** MSU has centers of national excellence in area and international studies and foreign languages that help train students for jobs in a highly globalized economy. The strong international content across **MSU curricula prepares our students to be successful members of an increasingly globalized workforce.** Many of MSU's current students will work with companies that have international activities. An internationally savvy, globally prepared workforce in Michigan will help attract companies from around the world to the state.

### *Leading the Way in Job Preparation MSU Graduates Are in Demand among Top Employers*

**Employers seek out MSU graduates:** 270 employers participated in **career fairs** at MSU in 2004–05; 94 employers conducted **on-campus interviews** at MSU in 2004–05; 437 employers **hired one or more MSU graduates** in 2002–03.

**MSU is a preferred provider to employers:** For the 2004–05 school year, MSU was selected as the first enterprise-wide University Relations program at Pfizer. The diversity and strength of MSU's programs allows Pfizer to leverage one school for enormous impact across a wide range of academic areas. When Pfizer opened up their R&D summer program this year, **MSU had the most qualified applicants of any lead university** in the country, including UM. MSU

**MSU engineering discoveries create new opportunities from Michigan to Mars:** Nanotechnology research opens up new worlds: A nanoplatelet form of graphite, discovered at MSU, is the basis for a collaborative project with NASA and TJ Technologies of Ann Arbor to produce the **next generation of extended-life, high-capacity batteries** that will be used on the next Mars Rover. Research is under way to identify additional applications for use closer to home.

**Online education programs:** MSU's large array of online education programs extends **access to MSU's courses, degree, and certificate programs to students throughout the state to anywhere in the world, 24/7.**

**Economic impact of investment:** Michigan's 15 public universities collectively generated **\$26 of economic impact for each dollar of state support** received attributed largely to the difference in average earnings (and spending) between university graduates and those with only a high school diploma. So the state's investment of \$1.5 billion in its public universities in 1999 had a net economic impact of \$39 billion, representing 12.6 percent of Michigan's gross state product for that year. **Research universities generate an even greater return** because of the federal grant dollars that they bring to Michigan.

supplied 253 qualified candidates for summer internships with Pfizer, some 29 percent of the total pool from 11 lead universities.

**Graduate education and job preparation:** In the past, the minimum expectation for an educated worker was a high school diploma, then a bachelor's degree. As we move into the twenty-first century, a worker who is prepared to thrive and survive in the rapidly changing economy will require even more. **Graduate education is of fundamental importance in preparing the necessary leaders for the knowledge economy of the twenty-first century.** The advanced training at both the master's and doctoral levels prepares students for leadership roles in the academy, industry and business,

**MSU Extension Service:** At the heart of our land-grant mission, MSU's Extension Service provides access to MSU's knowledge base in every county in the state.

**MSU trains tomorrow's citizen leaders today:**

MSU's Institute for Public Policy and Social Research (IPPSR) serves Michigan's policymaking community with top-notch research and world-class political leadership training. The institute's efforts are shaped by input from legislators, key staff members, state department officials, university faculty, and policy practitioners. The Institute's Legislative Leadership Program (LLP), sponsored in conjunction with MSU Extension, engages newly elected state legislators with scholars, current legislators, and other practitioners to discuss public-policy issues and the policy-making process. And for those seeking greater involvement in that public policy process there is the Michigan Political Leadership Program (MPLP), a scholarship-funded certificate program.

**MSU makes Michigan's citizens safer:** MSU's Department of Computer Science and Engineering and School of Criminal Justice have partnered to offer a "cognate" program (similar to a minor) providing students with preparation in the areas of criminology, investigative procedures, cybercrime, identity theft, and computer forensics. The program addresses a growing demand for people with skills that bridge computer science and criminal justice, particularly in the expanding area of homeland security. Graduates of the program are highly sought by both private and public sector employers.

**Research and educational networking:** MSU, the University of Michigan, and Wayne State University partnered to create the Merit Network, America's

first regional research and education network, whose mission is to make Michigan a showcase for high-performance networking. In addition, MSU and UM were two of the original 38 members of the Internet2 initiative, headquartered in the state.

**MSU supports cutting-edge public utility policy formation:** The Institute of Public Utilities provides the regulatory policy community with integrative, interdisciplinary, and balanced educational programs and applied research on the institutions, theory, and practice of modern economic regulation. The Institute is an independent, self-supported, and nonprofit educational and research unit affiliated with several colleges.

The Quello Center in MSU's College of Communication Arts and Sciences is a worldwide focal point for excellence in research, teaching, and the development and application of expertise in the telecommunications industry.

**MSU research keeps Michigan transportation systems moving:** Sponsored by the Michigan Department of Transportation, MSU's Pavement Research Center of Excellence conducts research and technology transfer on the effects of conventional pavement materials, composite materials, design, quality, preventive maintenance, and rehabilitation practices on pavement performance.

**MSU leads in land-use policy:** A variety of research centers, institutes, and programs contribute to the interdisciplinary land-use policy program at MSU. The program's mission is to provide effective science-based solutions and educational/outreach programs to support various state, national, and international stakeholders.

**MSU: Leading the Way on Cherry Commission Recommendations**

*The report of Gov. Jennifer Granholm's Commission on Higher Education and Economic Development (The Cherry Commission) offers a good roadmap for meeting the governor's challenges to Michigan's public higher education system. As the state's land-grant university, committed to engage with society and work for the public good, Michigan State University is already traveling the road toward a successful future and has numerous programs and initiatives in place that support the recommendations:*

**PROM/SE math and science program:** Promoting Rigorous Outcomes in Mathematics and Science Education (PROM/SE) is a five-year, \$35 million comprehensive math/science partnership led by MSU and funded by the National Science Foundation (NSF). It will benefit nearly 400,000 students and 18,000 elementary, middle, and high school science and mathematics teachers. One of the partnership's objectives is to prepare future teachers to teach math and science to diverse student populations.

**Teachers for a New Era:** In the fall of 2002, MSU was one of three other institutions invited to be the inaugural sites in the Carnegie Corporation of New York's Teachers for a New Era initiative (TNE), a national effort to develop state-of-the-art schools of education and to influence public policy relative to the quality of teaching and the teachers of the future.

**Related initiatives:**

**Dow-Corning New Era Internships,** supported by a grant of \$200,000 to give K-12 science teachers hands-on experience in research labs, a learning opportunity they can take back to their own classrooms.

**MSU Leadership in Development of Michigan K-12 Standards and Expectations for Mathematics and Science,** in which MSU faculty from the Colleges of Education and Natural Science volunteered their time and expertise in leadership roles to develop the most recent version of Michigan's K-8 Grade Level Content Expectations in Mathematics.

**Knowledge of Algebra for Teaching Project,** offers algebra teachers tools for assessing mathematical knowledge for teaching across grade levels and mathematical domains and deeper understanding of the ways in which they have opportunities to acquire this kind of knowledge.

**Problem-Based Learning Professional Development Project,** funded by a \$4.1 million grant from the NSF to develop and implement a five-year project for improving K-12 mathematics and science teaching and learning.

**College of Education partnership with Detroit Public Schools:** The Broad Foundation has committed \$6 million in funding support for this collaborative effort to develop highly trained urban educators for service in the Detroit school system. This initiative offers an opportunity to increase the presence of highly qualified teachers in the Detroit Public Schools.

**Diagnostic Question Clusters,** another NSF-funded project that is developing questions to be used in introductory biology and geology courses at the college level, involving MSU faculty from the Colleges of Natural Science and Education.

**Noyce Scholarship Program** funds both one- and two-year scholarships for talented college students who commit to becoming K-12 mathematics or science teachers in high-need districts.

**Teachers as Designers** is an innovative program to prepare prospective teachers, in-service teachers, and teacher educators to use advanced technology to improve student learning.

**Center for the Study of Mathematics Curriculum** is funded by the NSF to expand the base of expertise and leadership for K-12 mathematics curriculum design, analysis, implementation, and evaluation and to provide opportunities for the next generation of mathematics curriculum developers.

**Connected Mathematics Phase (CMP) II**, funded by an NSF grant to design, develop, and evaluate an **innovative mathematics program for middle grades** that would reflect recommendations of the National Council of Teachers of Mathematics Standards. The CMP Office at Michigan State University, assists teachers, administrators, parents, school districts, and mathematics educators.

**The Learning Online Network with Computer-Assisted Personalized (LON-CAPA)** approach, a

### ***MSU in the Vanguard A Powerful Engine for Economic Development***

*Since 1855, MSU has been in the vanguard when it comes to preparing our students — our citizens — to build and participate in the state's economy. We need only look to Michigan's history to see how better-educated, better-prepared citizens have driven economic development in our state — originally in cutting-edge scientific agriculture; then as national leaders in manufacturing; and now, preparing for the new knowledge economy of the future.*

*Through partnerships with other public and private entities and alongside ongoing state initiatives, like the governor's "Cool Cities" and the Technology Tri-Corridor, Michigan State University will be a key player in creating the regional talent centers to grow and attract new industries, to do the cutting-edge research that will underpin them and to keep the best-prepared and best-trained individuals living and working in Michigan.*

*To build Michigan's future, we have to imagine it now. As Abraham Lincoln said, "You cannot escape the responsibility of tomorrow by evading it today." That's our challenge — to build something enduring that will benefit the people of Michigan for years to come by investing now.*

**MSU ranks among the best research universities in the world:** Michigan State University, the state's land-grant university, is also **one of the 62 leading research universities in North America** (a member of the prestigious Association of American Universities) and is **among the top 100 research universities in the world** (Shanghai Jiao Tong University study from 2004) based on quality of education, faculty, research output, and size of institution.

project that goes back to 1992, when the CAPA system was first used at MSU to administer online homework in a physics course.

Today, LON-CAPA is used at 21 middle schools and high schools, two community colleges, and 21 colleges and universities with more than **25,000 users each semester**. At Michigan State University, LON-CAPA serves more than 12,000 students with more than 16,000 course enrollments in over 400 course sections each semester.

**MSU's leading programs prepare students to work:** MSU is one of the top universities in the country when it comes to preparing students to work: *U.S. News & World Report's* "Best Graduate Schools" **ranks 32 graduate programs at MSU as among the best in the nation**. Ranked number one are the following: Higher Education and Administration, Secondary Education, and Elementary Education. Other graduate programs ranked in the top 10 are: Administration/Supervision (Education), Educational Policy, Educational Psychology, Curriculum and Instruction, and Rural Medicine. *U.S. News* also ranked The Eli Broad College of Business as twentieth in the nation for undergraduate education.

**"The Investment Payoff" — MSU offers benefits to all of Michigan:** Support for higher education has significant returns on investment for state and local governments and for all residents of Michigan. Private economic benefits: **higher personal income and lower unemployment**. Public economic benefits: **decreased reliance on public assistance**. Private social benefits: **better health**. Public social benefits: **increased volunteerism and increased voting participation**. Data shows that college is "good" and that more college is "better." Personal income goes up depending on the amount of college and type of degree one has earned. In Michigan, the higher the degree earned, the lower the percentage of unemployment.

Alliance is a collaborative relationship with educational and community groups to implement middle-high school, community college, and undergraduate programming to **provide disadvantaged students with the skills necessary to successfully enter and graduate from health professions schools** and develop a competitive underrepresented and disadvantaged applicant pool for the health professions in mid-Michigan.

**Nursing:** A key workforce issue in the field of nursing is increasing the number of nurses with a Bachelor of Science Nursing degree. **MSU nearly doubled its entry into practice enrollments (from 80 to 148) this year and MSU's Registered Nurse-BSN program is now on the Web for flexibility and accessibility.**

MSU's College of Nursing (CON) operates the Nursing HealthCare Center, providing **clinical placement** for undergraduate and graduate nursing students, social work students, and pharmacy students. CON Faculty in Practice provides **clinical training** sites for student learners as undergraduates and graduate students in community settings. CON also offers an online **RN refresher program** to prepare nurses planning to **return to active clinical practice**.

**MSU trains skilled health care professionals to work in communities across Michigan:** Trained nurse practitioners serve populations at risk. The nurse practitioner (NP) is especially well equipped to partner with patients and families to meet health care needs, particularly in the areas of **health promotion and illness prevention**. CON has prepared some 90 NPs in northern Michigan and 90 percent of them remain in northern Michigan serving Native Americans, migrant workers, and Medicaid populations. Others are practicing in Michigan Primary Care Health Centers, which **serve needy populations**, volunteering their time and expertise to serve those who have no insurance and who otherwise cannot access health care.

Graduates from the College of Osteopathic Medicine are leaders in providing **direct care to the elderly and uninsured**. Students provide their time to help area **homeless** at the Lansing Friendship Clinic and **migrant workers and Hispanic population** at the Cristo Rey Health Care Clinic in Lansing. The Department of Pediatrics operates a **Medicaid clinic** in the Lansing area and is one of the largest pediatric health providers in the community.

**MSU builds economic success in Michigan:** The Eli Broad College of Business advances **executive development** by offering open-enrollment programs to improve the knowledge, skills, and capabilities of business professionals throughout Michigan. Part-time and specialized master's degrees are designed to give working professionals throughout the state an opportunity to earn an advanced degree. Michigan employers clearly value these programs, offering full tuition support for their employers. Individuals seek these advanced degrees in order to help them advance economically, to ensure job security, and to provide a hedge against outsourcing threats.

**Fostering entrepreneurship:** Customized programs are designed, developed, and delivered by to meet the unique requirements of Michigan corporations and organizations. The Masco Leadership Program in Operations Management has educated more than 100 individuals to date and has generated a return-on-investment for Masco Corporation of more than 500 percent. This public-private partnership translates into millions of dollars to **support innovation and process improvement** initiatives that move Michigan's economy forward.

**Broad School graduates are among the best prepared:** Undergraduates are highly qualified in terms of their GPAs, and the program continuously **ranks among the top 25 in the country**. The Broad School's master's and doctoral degree programs, as well as Executive Development Programs excel in the education and development of business leaders and in the creation and dissemination of knowledge. The Broad School contributes to economic development by providing a **highly skilled labor pool of management professionals**.

**MSU makes a difference in communities:** MSU's Center for Urban Affairs Community and Economic Development Program makes a difference in communities by improving skill levels of participants in activities developed by the program, improving civic leaders' understanding of ways to **solve local community problems, and developing innovative program strategies to reach previously underserved urban populations**.