EXECUTIVE SUMMARY FOR THE SCHOOL OF SCIENCE AND MATHEMATICS ANNUAL REPORT

A. School Highlights for 2010-2011 (details follow)

Millersville continues to be a leader in the PA State System of Higher Education (PASSHE) and the Commonwealth in the education of students in computer science, mathematics, the sciences and nursing. The University continues to graduate among the highest number of science, mathematics and computer science students in PASSHE, with an emphasis on academic excellence. A sampling of the outstanding achievements of students and faculty include:

B. Student Achievements (selected detail)

Undergraduate and Graduate Research and Student Awards:

- **Gulnar Mangat** received a travel grant from the Council on Undergradute Research to attend and present at the Mid-Atlantic Meeting for the Society for Developmental Biology, June 3-5, 2011 in Philadelphia.
- Four students (**Kristin Sloyer**, **Kevin Mlynek**, **Dustin Sparr** & **Brian Sheaffer**) attended the CPUB meeting in April 2011; **Kevin Mlynek**, **Ian Miller**, **Dustin Sparr** & **Robbie Hicks** received First place in Poster Session Ib (Ecology & Organismal Biology) and **Brian Sheaffer** received First Place in Poster Session IIb (Cell & Molecular Biology).
- **Kristin Sloyer** has accepted an REU internship at the Cary Institute of Ecosystem Studies in Millbrook, NY for Summer 2011. **Carissa Alza** has been offered an REU at La Selva Biological Station in Costa Rica.
- **Kristin Sloyer** was presented with the Student Research Award from the Entomology Society of Pennsylvania at its Nov. 20, 2010 annual conference at Fort Indiantown Gap, PA.
- The **American Chemical Society Student Chapter** received an Honorable Mention Chapter Award for its 2009-2010 activities, received at the 241st ACS National Meeting in Anaheim in 2011.
- Nine computer science majors participated in the programming contest the annual PACISE conference. The Millersville Marauders team consisting of **William Killian, Matt Maze and Ben Bryant** placed 2nd out of a total of 26 teams. The Millersville Black team consisting of **Matt Pape, Bob Grube, and Daryl Boyer** placed third.
- The Millersville Marauders team also placed first at site (at Shippensburg), in the ACM Mid-Atlantic USA Programming Contest.
- **William Killian** received a National Institute of Standards and Technology Research Fellowship for summer 2010 in Gaithersburg, MD.
- **Rachelle Holnaider** attended the Summer Program for Women in Mathematics at The George Washington University in Washington DC in summer 2010. The program accepts only 16 young women annually.
- **Matthew Keefe** was accepted and plans to attend the Summer Research Experience for Undergraduates at The University of Pittsburgh in biostatistics in Summer 2011.
- **Neil Obetz** was accepted and plans to attend the Summer Research Experience for Undergraduates at University of Maryland, Baltimore County in Interdisciplinary Program in High Performance Computing in Summer 2011.
- **Mary Ellen Francescani** won the 2010 Lancaster Osteopathic Health Foundation nurse Scholarship Award / Linda Gort CRNP Scholar Award.
- **Matthew Lewis** was accepted into REU (Research Experience for Undergraduates) programs at Cornell, Lehigh, and University of Maryland. He accepted the offer from the University of Maryland

and will help conduct research on "Multifunctional Atomic Layer Deposition (ALD) Films as Oxidant Barriers".

- At the 2011 School of Science and Mathematics Research Recognition Symposium, thirty-four students were recognized for 108 student-faculty research projects, along with students who received internships, grants and awards. In addition, the Departments of Biology, Earth Sciences and Mathematics all have their own departmental Honors and Awards ceremonies to recognize top academic achievers in their departments.
- The School of Science and Mathematics continued its emphasis on a capstone research experience, with the school's Spring 2011 Research Poster Display, showcasing 23 posters with joint faculty/student authors; the Fall 2010 Homecoming Poster Display included 14 posters with joint faculty/student authors.
- Fourteen nursing graduate students completed Scholarly Projects in 2010-2011.
- Forty-Three (43) SCMA students completed co-ops during 2010-2011.
- Nineteen (19) SCMA students gave presentations on their research at regional or national professional meetings during 2010-2011. These included: Experimental Biology 2011 in Washington DC, the American Society of Anatomists mini-meeting on Neural Crest Cells & Placodes, the Commonwealth of Pennsylvania University Biologists, the American Chemical Society, the Pennsylvania Computer and Information Science Educators, the Central PA Section of the American Association of Physics Teachers meeting and at the Millersville Student Research Conference. In addition, many students presented research papers on campus at departmental colloquia.
- Seventeen (17) SCMA students were selected for internships with various agencies in 2010-2011, including the National Institute of Standards, the University of Maryland, WGAL-TV, WJET-TV, WPMT-TV, WHP-TV, the University of Pennsylvania, North Carolina State University, the Cary Institute of Ecosystem Studies, La Selva Biological Station in Costa Rica, George Washington University, University of Pittsburgh, and the University of Maryland, Baltimore County.

Graduate and Professional School Placements:

Graduate Schools: In Fall 2011, SCMA graduates will be starting their graduate studies at the following universities: Penn State, University of Pennsylvania, University of Arizona, Drexel University, University of Rochester, University of North Carolina at Chapel Hill, University of Delaware, University of Maryland, DeSales University, University of West Virginia, Temple University, the University of Kentucky and the Naval Nuclear Power School.

Professional Schools: In Fall, 2011, SCMA graduates will be beginning their medical studies at Drexel University College of Medicine and the Philadelphia College of Osteopathic Medicine. Another graduate will begin his studies at the Temple University School of Dentistry. One student has been accepted into graduate programs in physical therapy at Arcadia, Drexel and Temple Universities and her decision is still pending. Another graduate has been accepted to medical school at Lake Erie College of Medicine and the Philadelphia College of Osteopathic Medicine and a decision is still pending.

Testing Results

External testing provides a measure of the quality of the School's academic programs, and the School's graduates have performed very well against national standards. There is a **100% pass rate on the** AACN Family Nurse Practitioner Certification Exam and the **respiratory therapy** licensure

examinations. There is a **100% pass rate on the Praxis** content exams for science and mathematics education majors. Graduating chemistry, computer science, and physics students take the **ETS Major Field Achievement Test** to monitor program quality. The **average** percentile scores for the past ten years are at the **77th, 72nd, and 60th percentile**, respectively.

C. Faculty Achievements (selected detail)

Millersville faculty and staff members are active scholars, and their scholarship helps to make them better teachers. In 2010-2011, SCMA faculty members **published 3 books, with 3 additional books currently in press** and **52 articles, with 6 additional papers in press.** SCMA faculty presented **80 papers** at professional meetings and attended **92 professional conferences or seminars**. It is noteworthy that much of the faculty research is conducted collaboratively with Millersville students.

External Grants

SCMA faculty and administration submitted forty-nine (49) external grant or contract proposals in 2010-2011, representing requests in excess of $13,000,000, which is a substantial increase over the $7,000,000 in funding requests during 2009-2010. Twenty-one new grants and contracts were funded (for approximately $900,000), not including several carried over from previous years; 6 funding decisions are still pending at this time (for approximately $1,450,000). It is notable that SCMA faculty and staff have not only increased the number of grants submissions, but have also increased the number of large federal grants submitted, with three grant proposals of over $1,000,000 submitted during the past year.

Selected new grant awards in 2010-2011 include:

- $235,199 awarded by NSF to Dr. Gary Zoppetti (CSCI) for a collaborative research project to develop the SoCS - ExSciTecH: an interactive, easy-to-use volunteer computing system to explore science, technology and health.
- $10,849 awarded to Dr. Barbara Zimmerman (NURS) by the PA Higher Education Foundation: 2010-2011 Nursing Education Scholarship Program.
- $13,010 awarded to Dr. John Wallace (BIOL), by the PA Department of Environmental Protection, to study the impacts of stream restoration on macroinvertebrate community structure in Big Spring Run.
- $104,857 awarded to Dr. Stephanie Elzer (CSCI) by the NSF, to fund a collaborative research project on exploiting information graphics in digital libraries.
- $52,349 awarded to Dr. Dominique Dagit (BIOL) by the NSF, to fund a five-year collaborative research project on jaws and backbones: chondrachthyan phylogeny and a spine for the tree of life. This was part of a larger $2.8M grant awarded to a consortium of faculty at a number of institutions.
- $110,928 awarded to Dr. Richard Clark (ESCI) by NASA, to fund a research project involving a team of MU faculty and students in an air quality study.
- $16,000 awarded to Dr. M. James Cosentino (BIOL) by the Organization for Chemical Sciences, to fund shipment of large volumes of books, journals and computers to universities in the developing countries of Morocco, Ethiopia, Liberia and Rwanda.
- $10,000 awarded to Dr. Jeremiah Mbindyo (CHEM) by Cephalon, Inc., to fund research on the development of a nanotechnology drug delivery system.

Continuing grant awards include:

- $585,000 NSF S-STEM grant (Drs. Whisenton, Dagit, Shane, Smith, Dushkina, and Elzer) that continues to provide scholarship support to financially needy mathematics, computer science, and science students.
- $350,000 NSF grant to Drs. Gary Zoppetti (CSCI), Richard Clark (ESCI) and Sepi Yalda (ESCI), "GEOPOD: GEOscience Probe of Discovery".
- $172,375 awarded by the US Army ASAMRAA to Dr. Roger Webster (CSCI) for development of an Ocular Surgery Simulator.
- $123,134 awarded by the NSF to Dr. Jason Price (ESCI) for study of the influence on radiation damage on the solubility of epidote-group minerals during chemical weathering.
- $62,435 awarded to Dr. Ajoy Kumar (ESCI) by East Stroudsburg University on the project: Projecting the Impacts of Climate Change and Identifying Adaption Options at Chincoteague National Wildlife Refuge.
- $33,480 awarded to Mr. Eric Horst (ESCI) by PennDOT, for winter storm forecasting.
- $134,951 awarded to a team of SCMA and SOE faculty and staff (Smith, Boal, Ambler, Dagit, Kumar, Bray, Dreon and Dietrich) to develop a program supporting education at the Marine Science Consortium.
- $52,580 from the PA Department of Environmental Protection to Dr. Richard Clark (ESCI) for continuing work on the Millersville Acid Rain Monitoring Site Project.

Faculty Awards and Leadership Roles (selected):

- Dr. Dominique Dagit (BIOL) serves as the Chair of the Academic Advisory Council for the Marine Science Consortium.
- Dr. Ryan Wagner (BIOL) was elected as President of the Commonwealth of Pennsylvania University Biologists (CPUB).
- Dr. Jeremiah Mbindyo (CHEM) is a member of the Academic Advisory Board of the Nanotechnology Institute. He also serves as a member and lead faculty for the Program Design and Implementation Taskforce of the Pennsylvania Collaborative for Applied Nanotechnology and as a member of the Editorial Advisory Board for 2 journals: *Proteus* and *Scientific Journals International*.
- Dr. David Hutchens (CSCI) serves on the PACISE Editorial Board, along with the statewide Program Articulation Committee for Computer Science.
- Dr. Blaise Liffick (Computer Science) was named to the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).
- Dr. Alex DeCaria (ESCI) was presented with the Pennsylvania Science Olympiad Distinguished Service Award in March, 2011.
- Dr. Sepideh Yalda (ESCI) serves as Chair of the Advisory Panel for the Cooperative Program for Operational Meteorology, Education and Training (COMET). She is also a member of five American Meteorological Society committees, the Eyes on the Environment Advisory Committee and the National Environmental Education Foundation (NEEF).
- Drs. Maria Schiza (CHEM) and Mehmet Goksu (PHYS) serve as Co-Coordinators of the Central PA Regional Science Olympiad.
- Dr. Todd Sikora (ESCI) is a member of the University Corporation for Atmospheric Research (UCAR) Membership Committee and was also a member of the statewide Physical Sciences Program Articulation Committee.
- Dr. Richard Clark (ESCI) serves on the Board of Trustees of the University Corporation for Atmospheric Research (2009-2012) and is an elected member of the Council of the American

Meteorological Society (2008-2011); he also serves on four committees of the AMS and on one subcommittee of the UCAR Board.

- Dr. Sam Earman (ESCI) is an Associate Editor for the peer-reviewed publication *Hydrogeology Journal*.
- Dr. J. Robert Buchanan (MATH) serves as an associate editor for the *Journal of Applied Mathematics*.
- Dr. Ximena Catepillán (MATH) serves as a Member-at-Large on the Executive Committee and as a member of the Travel Study Programs Committee of the Eastern PA and Delaware section of the Mathematical Association of America.
- Dr. Kevin Robinson (MATH) serves as Vice President of the Harrisburg Chapter of the American Statistical Association and as an Associate Editor for the *Journal of Statistics Education* and for the *Journal of Probability and Statistical Science*.
- Dr. Delray Schultz (MATH) serves as the Vice Chair for District 3 of the American Statistical Association's Council of Chapters and was co-chair of the statewide Mathematics Program Articulation Committee. He serves as a Question Leader for the national AP Statistics exam reading.
- Dr. Robert T. Smith (Dean's Office) serves as Vice Chair of the Advisory Board for the Innovation Transfer Network (ITN) and serves as a member of the statewide Transfer Articulation Oversight Committee (TAOC).
- Dr. Janet White (MATH) is the liaison from the Association of Mathematics Teacher Educators/Pennsylvania Council of Teachers of Mathematics to the Pennsylvania Association of Mathematics Teacher Educators, a member of the nominations Committee of the Pennsylvania Association of Mathematics Teacher Educators and is President-Elect for the Pennsylvania Association of Mathematics Teacher Educators. She was the coordinator and a scorer for the area MATH Counts competition held at Millersville, was a reader for the national AP Statistics exam and serves as a reviewer for *The Mathematics Teacher*. She also served as an NCATE NCTM SPA evaluator for 4 national reports.
- Dr. Kelly Kuhns (NURS) is the President of Region # 15 of the PA State Nurses Association.
- Dr. Barbara Zimmerman (NURS) is the Past Chair of the National Association of School Nurses (NASN) Special Interest Group Consortium of School Nurse Educators, leading a national meeting in June 2011 (Washington, DC) and also serves on manuscript review panels for the *Journal of School Nursing* and the *Rehabilitation Nursing Journal*.
- Dr. Tariq Gilani (PHYS) served as co-chair of the statewide Physics Program Articulation Committee.
- Dr. Mehmet Goksu (PHYS) was elected as Secretary of the Central PA Section of the American Association of Physics Teachers and served on the grant review committees for the Electrical, Electronics & Computer Technology and Construction divisions of the Association of Technology, Management, and Applied Engineering (ATMAE).

Special Activities of Note:

With Millersville's emphasis on undergraduate research, it is significant that five collaborative student/faculty research groups published papers in the past year. A group of five students working with Dr. Jean Boal (BIOL): M. Walderon, K. Nolt, R. Haas, K. Prosser and J. Holm had their paper, "Distance chemoreception and the detection of conspecifics in *Octopus bimaculoides*" accepted for publication in *The Journal of Molluscan Biology*. Dr. John Hoover and Rodney Ritzel (BS BIOL '07) had a paper reporting the results of Rodney's honors thesis published in the *Journal of Pa. Academy of Science*. Students Matthew Pape and Robert Grube published and presented "Face the Waste: A Software Productization Center Project from the Computer Science Student's Perspective", together

with Dr. Stephanie Elzer (CSCI) in the *Proceedings of the 26th Annual Conference of the Pennsylvania Computer and Information Science Educators*. John Gemmer (2006 alumnus - double major in Physics and Mathematics) had his paper "Generalizations of the Brachistochrone Problem" (with Drs. Mike Nolan and Ron Umble), based on his undergraduate honors thesis, published in the *Pi Mu Epsilon Journal*. Drs. Tariq Gilani and Natalia Dushkina (PHYS) published a paper with MU Physics alimnus Drew Pulsifier: T. H. Gilani, N. Dushkina, W.L. Freeman, M. Z. Numan, D. N. Talwar, D. P. Pulsifer, "*Surface Plasmon resonance due to the interface of a metal and a chiral sculptured thin film*", which appeared in *Optical* Engineering in December, 2010.

Dr. Dominique Dagit (BIOL) wrote a chapter, "Phylogeny, Biology, and Classification of Extant Holocephalans", to appear in the 2nd edition of the forthcoming book, *Biology of Sharks and Their Relatives*. Dr. Lyman Rickard (CHEM) had the 5th edition of his textbook, *Chemistry: Structure and Dynamics*, co-authored with J. N. Spencer and G. M. Bodner, published by John Wiley & Sons. Dr. Travis Miller (MATH) published two book chapters: "A Model for Asynchronous Discussions in a Mathematics Content Course" in *Teaching Mathematics Online: Emergent Technologies and Methodologies* and "A theoretical framework for implementing technology for mathematics learning" in *Educational Technology, Teacher Knowledge, and Classroom Impact: A Research Handbook on Frameworks and Approaches.* Dr. Robert T. Smith (Dean's Office), together with his co-author Dr. Roland Minton of Roanoke College had the 4th editions of their two textbooks: *Calculus* and *Calculus: Early Transcendental Functions*, published by McGraw-Hill in 2011.

School of Science and Mathematics Outreach Programs:

A total of 507 students and 48 teachers from 40 middle school and high schools attended the **Central PA Science Olympiad** that was held for the fourth time at Millersville University in spring 2011. The **Brossman Science Lectureship** attracted about 900 elementary, middle school and high school students and members of the community to two presentations by MIT professor Dr. Alan Lightman, related to his work as a physicist and a novelist, referring to his novel, *Einstein's Dreams*, which had been selected as the freshman reading book. The **Women in Mathematics and Science Conference** was attended by 250 students from 50 middle and high schools, who attended the keynote address by Captain Colleen Nevius, a retired US Navy test pilot and her husband, William Readdy, a retired NASA astronaut; students also participated in a number of breakout sessions with successful women in mathematics and science careers. Eighty-seven students from twenty-two high schools in South-Central PA participated in the annual **High School Mathematics Contest**. The **AP Calculus** simulation offered by the Mathematics Department in collaboration with IU-13 was expanded in 2011 to include separate AB and BC simulations; a total of 359 students and 27 teachers participated. The **AP Statistics simulation** attracted 266 students and 16 teachers. Another 350 students and 37 teachers participated in similar simulations offered to Harford County, Maryland students. A **Nursing Lectureship** was offered for area nurses, and the Department of Computer Science offered two public **computer science 'Social Issues' lectures**. A number of SCMA faculty members spoke at area elementary, middle, and high schools as part of the School's **Spotlight on Science (SOS)** program. **Summer science and mathematics workshops** (SSTP) were offered for 35 middle and high school students over 9 days in summer 2010; twelve of these students were supported by scholarships.

D. Significant School Achievements

In the summer of 2010, the Department of Nursing was awarded with the reaccreditation of its BSN and MSN programs by the National League for Nursing Accreditation Commission, for the maximum eight year period. During the Fall 2010 semester, the Department of Computer Science hosted a site visit by a

team from the Accrediting Board in Engineering and Technology (ABET). Following this visit, our Computer Science program was recommended for re-accreditation by the visiting team. We are awaiting action by the full ABET Board later in summer of 2011. During 2010-2011, the Department of Earth Sciences developed a new Professional Science Masters program: a Master of Science in Integrated Scientific Applications, which was approved by the Faculty Senate, the MU Council of Trustees and the PASSHE Board of Governors. This new, flexible program will include a number of different specializations in such areas as: *Environmental Systems Management (ESM), Geoinformatics (GI), Weather Intelligence and Risk Management (WIRM),* and *Climate Science Application (CSA).* The program is planning to welcome its first cohort of students in the Spring 2012 semester. The Department of Nursing developed a completely revised BSN curriculum, which will be implemented in 2011-2012; the department also arranged to offer its BSN curriculum partially onsite to nurses at the Coatesville Veterans Administration Medical Center, with the balance of the program offered online.

SCMA faculty and MU administration have been instrumental this past year in implementing a series of reforms at the Marine Science Consortium, of which MU is a senior full member. Principally, this involved breaking down barriers to make it easier for faculty to offer new courses at MSC and make it easier for students to register for courses at MSC. This included allowing faculty to offer courses in shorter time periods, instead of adhering to the traditional 3-week sessions. MU President McNairy was Chair of the MSC Board for 2010-2011; MU Provost Prabhu chairs the MSC Council of Academic Administrators and Dr. Dominique Dagit (BIOL) chairs the MSC's Academic Advisory Committee. Through MU's leadership, the MSC made significant changes to the college course registration systems, including the advent of online registration for MSC courses, directly with the campus offering that course. The changes proposed and pioneered by MU have resulted in a nearly 100% increase in the number of students paying tuition for MU courses at the MSC and a 60% increase in the total number of students enrolled in MSC college courses. MU faculty and staff continue to work on changes in MSC college offerings and procedures.

E. Summary

Despite unprecedented budgetary challenges, 2010-2011 was **another highly productive year** for SCMA students and faculty. No doubt our greatest challenge this past academic year was reducing our usage of faculty complement, despite steadily increasing demand for our courses, driven by several years in a row of substantial increases in the number of SCMA majors. In preparing for 2011-2012, the school reduced its faculty complement usage by approximately 90 semester hours (nearly 4 FTE faculty), above and beyond the previous 90 credit reductions that were already in place for 2010-2011. This was accomplished through a combination of reductions in faculty alternate workload assignments, reduction in low-enrolled sections (mostly advanced electives for majors) and the elimination of a large number of general education laboratory sections. Most significant was the elimination of nearly all laboratory sections of BIOL 100 (General Biology) and ESCI 109 (The Atmosphere). In the case of BIOL 100, students registered in non-laboratory sections in Fall 2011 will have one additional hour of direct instruction (in large lecture format), which the instructor will use to attempt to meet most of the learning objectives of the eliminated labs. Despite this backdrop of contraction, faculty continued their active record of undergraduate student-faculty research, successful publication and presentation (by faculty and students). Faculty and staff were also very active in writing external grant proposals. SCMA faculty and students continue to earn recognition at the regional and national level for their scholarly achievements and for service to their professional communities. During 2010-2011, SCMA faculty developed the first new graduate program in many years, with the approval of the MS program in Integrated Scientific Applications. This program represents a flexible graduate program for the purpose

of training new practitioners in scientific areas, through several different tracks. The flexible nature of the program will allow us to develop new program options more easily than we can develop entire new programs, positioning us to respond more quickly to changing market demands. Significantly, MU SCMA graduates continue to contribute significantly to the Commonwealth's emphasis on the STEM disciplines, as they move into jobs in business and industry and teaching positions in mathematics and science, as well as graduate and professional study in STEM fields.