



Creating Consensus on Vision and Strategy

**Wright State University
College of Science and Mathematics
Strategic Plan
Phase I - Departmental Core Capabilities
Assessment Summary**

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Overview

The Wright State University College of Science and Mathematics (hereinafter known as CoSM) is currently developing a five-year strategic plan for the college with special attention to each of its departments.

CoSM provides undergraduate and graduate degrees through six core science departments, including:

- **Biological Sciences**
- **Geological Sciences**
- **Physics**
- **Chemistry**
- **Mathematics and Statistics**
- **Psychology**

In addition, CoSM has two departments matrixed with the Boonshoft School of Medicine, including:

- **Bio-chemistry and Molecular Biology**
- **Neuroscience, Cell Biology, and Physiology**

CoSM offers nine undergraduate majors and eight undergraduate minors serving 1,550 students. In addition, CoSM has 14 Masters Degree programs serving 238 students. CoSM has three Ph.D. programs, including the:

- **Psychology Ph.D. Program** (which combines industrial/organizational and human factor psychology)
- **Bio-medical Sciences Ph.D. Program**
- **Environmental Sciences Ph.D. Program**

The CoSM faculty is prolific in obtaining grant funding. Core college departments have received over \$39 million in funded proposals and matrixed departments have received nearly \$11 million in funded proposals.

Dr. Michele Wheatley, Dean of CoSM, has engaged the Deans and Department Chairs in a commitment to develop a five-year strategic plan to strengthen their core capabilities and focus on strategies at the college level.



Overview (continued)

Strategic Leadership Associates has been retained to assist CoSM in developing a **College of Science and Mathematics 2012: Strategic Plan** in the following phases:

- **Phase I – Departmental Core Capability Assessments**
- **Phase II – CSM Top Level Vision and Strategy Development**
- **Phase III – Strategic Action Plan Development**

Between September and December 2006, department chairs convened representative teams of faculty to complete a core capability assessment for each participating CoSM department. The following report summarizes the assessments of these departmental teams, creating a baseline profile from a faculty perspective of current priorities and recommended initiatives.

Core Capabilities and Programs

The following Core Capabilities and Programs were identified for CoSM Departments at WSU. Core capabilities are defined as those fundamental service or contribution areas provided to key stakeholders through formal degree programs and research concentrations.

Biochemistry and Molecular Biology

- **Departmental Research Centers**
 - Center for Genomics Research
 - Center for Cellular Dynamics
 - Initiative for Biological Computation
 - Magnetic Resonance Laboratory
- **Extensive Classroom Involvement and Laboratory Training in Biomedical Sciences Ph.D. Program**
- **Masters of Science in Biochemistry and Molecular Biology, Thesis, and Non-thesis track degrees**
- **Research Concentrations**
 - Structure/Function of DNA/RNA
 - Protein Structure and Function
 - Metabolomics
- **Service Teaching in SOM, CoSm, and SON**
- **Extensive and Active Departmental Seminar Program**

Biological Sciences

- **B.S. in Biology**
 - Pre-professional
 - Exercise biology
 - Bio-informatics
 - Ecology
 - Microbiology
 - Life Science Education
- **B.A. in Biology**
 - Life Science Education
- **B.S. in Clinical Laboratory Science**
- **Minor in Biology**
- **M.S. (Thesis)**
 - Environmental Sciences
 - Biology
- **M.S. (Non-Thesis)**
 - Environmental Sciences
 - Biology
- **Inter-disciplinary M.S.**
 - Microbiology/Immunology
- **M.S.T. – Masters in Science Teaching**
- **Ph.D. Interdisciplinary Program**
 - Biomedical Sciences
 - Environmental Sciences
- **Certificate Programs**
 - Clinical Lab
 - Lake Campus
- **Research Concentrations**
 - Ecology
 - Cell Biology
 - Physiology
 - Micro-biology
 - Evolution
 - Environmental Science Education
 - Molecular Biology
 - Genomics
 - Bioinformatics

Core Capabilities and Programs

Chemistry

- Bachelor of Science in Chemistry (ACS Certified Program)
- Bachelor of Science with pre-professional option
- Bachelor of Science in Chemical Education
- Bachelor of Arts in Chemistry
- Bachelor of Science (dual major)
- Masters of Science in Chemistry
- Masters of Science in Chemistry (with environmental emphasis)
- Research capabilities (portfolio)
 - Organic Chemistry
 - Inorganic Chemistry
 - Physical Chemistry
 - Analytical Chemistry
 - Applied Chemistry (Environmental, Polymer, Surface, Theoretical)

Earth and Environmental Sciences

- B.A. in Geology, Environmental Geoscience, Geoscience Education
- B.S. in Geology, Environmental Geoscience, Geophysics, Environmental Health Science
- MST in Earth Science
- M.S. in Geology with diverse concentrations
- Ph.D. in Environmental Science
- Unique research capabilities:
 - Applied Geophysics
 - Hydrogeology
 - Watershed Processes
 - Environmental Risk
 - Unique instrumentation in field equipment, lab equipment, and software
 - Remote sensing and Geospatial Information Systems
 - Instrumentation for water chemistry

Core Capabilities and Programs

Mathematics and Statistics

- **Bachelor of Science in Mathematics**
 - **Mathematics Education**
 - **Pure Mathematics**
 - **Applied Mathematics**
 - **Computing**
- **Bachelor of Science in Statistics**
- **Bachelor of Arts in Mathematics**
- **Masters of Science**
 - **Pure Mathematics**
 - **Applied Mathematics**
 - **Applied Statistics**
- **Statistical Consulting Center**
- **Masters of Science in Teaching (interdisciplinary)**
- **Center of Excellence in Mathematics and Science Education**
- **Research Concentrations**
 - **Analysis**
 - **Applied Mathematics**
 - **Discrete Mathematics**
 - **Statistics**
 - **Mathematics Education**
- **Consulting capabilities for CoSM, Engineering, and Industry**

Neuroscience, Cell Biology, and Physiology

- **Participate in Biomedical Sciences Ph.D. Program**
- **Master of Science in Anatomy (traditional thesis track and non-thesis track)**
- **Master of Science in Physiology and Neuroscience Thesis Track (title pending)**
- **Faculty responsible for greater part of teaching in the first two years of the School of Medicine**
- **Contribute to new M.D./Ph.D. combined 7-year program**
- **Contribute to teaching in undergraduate anatomy and physiology to nursing, pre-medical, and biological science students**
- **NIH, NSF, and American Heart Association research concentrations in:**
 - **Circuits and Synapses in the Nervous System**
 - **Cell Signaling**
 - **Membrane Transport**
 - **Virology (e.g., HIV)**
 - **Bio-terrorism, Bio-defense**
 - **Immune Regulation**
 - **Educational Scholarship**

Core Capabilities and Programs (continued)

Physics

- Bachelor of Science in Physics
- B.S. in Physics with dual major degree in Mathematics
- Bachelor of Arts in Physics (Teacher Licensure Program)
- Bachelor of Arts in Science Education
- B.S. in Physics with options in Computing, Biology, and Geophysics
- Physics Honors Program
- Masters of Science in Physics
- Masters of Science with Medical Physics Option
- Masters of Science Teaching (Physics)
- Research Capabilities with concentrations in:
 - Materials – Optical and Electronic Properties
 - Geophysics
 - Spectroscopy
 - Applied Computations
 - Physics Education

Core Capabilities and Programs (continued)

Psychology

- Bachelor of Science in Psychology
- Bachelor of Arts in Psychology
- Ph.D. in Human Factors and Industrial/Organizational Psychology
- Masters of Science in Human Factors and Industrial/Organizational Psychology
- Affiliation with Bio-medical Science Ph.D. Program
- Undergraduate concentrations in:
 - Behavioral Neuroscience
 - Human Factors
 - Industrial/Organizational Psychology
- Undergraduate Honors Program
- Research Concentrations and Capabilities:
 - Behavioral Neuroscience:
 - Developmental Psychobiology
 - Neurobiology of Learning
 - Neuroendocrinology of stress and reproduction
 - Human Factors:
 - Decision-making
 - Cognition
 - Perception and Psychophysics
 - Aviation Psychology
 - Training Teams
 - Cross-cultural Cognition
 - Workplace Technology/Interface Design
 - Stress and performance
- Industrial/Organizational Psychology:
 - Selection
 - Training of Individuals and Teams
 - Motivation
 - Job Attitudes
 - Workplace Aggression
 - Quantitative Psychology
- Development
- Human Relationship
- Stress and Health
- Learning with Disabilities
- Extensive Collaboration with WPAFB and contractor community in Human Effectiveness
- Extensive research and collaborations with local industries through research, consulting, internships, SBIR's, etc.

Core Capabilities and Programs (continued)

Science and Mathematics Educators

- **Masters of Science in Teaching:**
 - Mathematics
 - Science
 - Integrated Program
- **Masters of Science in Teaching Physics**
- **Masters of Science in Teaching Earth and Space Science**
- **Masters of Education (through College of Education)**
- **Bachelor of Science in:**
 - Mathematics
 - Physics
 - Chemistry
 - Biology
 - Integrated Science
 - Geological Science
- **Bachelor of Science in Education:**
 - **Middle Childhood Education with concentrations in:**
 - Science
 - Mathematics
 - Core Courses for all students
 - **Early Childhood Education with core courses for all students**
- **Educational Specialist (post-Masters)**
- **Professional development for teachers partly through the Excel Center for Science and Mathematics Education**
- **Excel Center facilitation of regional collaborations**
- **Alternative Licensure Program(s)**
- **Research concentrations in:**
 - Program evaluation
 - Content-based research on student learning
 - Content-based research on teacher practice
 - Curriculum development
 - Pre-service, in-service, elementary and middle school learning
 - Integration of math and science
 - Impact of instructional models on learning
 - Pre-service teacher learning of mathematical modeling and of functions
 - Development of pedagogical content knowledge
 - Relationship of teacher knowledge and student achievement
 - Lesson study-teacher use of effective lessons
 - Effectiveness of teacher professional development and preparation
 - Instrument development for assessment

Strengths of Core Capabilities

As part of the overall core capabilities assessment, the faculty of CoSM departments identified the following current strengths of their departmental core capabilities. The following profile represents the non-prioritized view of strengths by department.

Biochemistry and Molecular Biology

1. Training of Graduate Students
 - #1 in CoSM for Ph.D. graduates in Biomedical Sciences
 - Track record of success in academia and industry for graduates
2. Active and successful post-doctoral training program
3. Collaborative research through core facilities
4. Nationally-recognized faculty
5. Seminar program for continuing education
6. Faculty membership on National Scientific Review Panels

Biological Sciences

1. Caliber of faculty
2. Variety and diversity of faculty
3. Research faculty with funded research
4. Balance between teaching and research
5. Access to campus woods and research sites
6. Student access to faculty
7. Research and sponsored programs (RSP)
8. Interdisciplinary interaction
9. Presence of women in science
10. Centralized student advising
11. Collaboration with school of education and medical school
12. Highly proficient office staff
13. Ecology and Plant Ecology
14. Undergraduate and graduate training in Bioinformatics
15. Undergraduate Exercise Biology
16. Science Education
17. Clinical Laboratory Sciences
18. Environmental Science Ph.D. Program
19. Statistical Consulting Center

Strengths of Core Capabilities

Chemistry

1. Recognition as an outstanding teaching department
2. Faculty awards for teaching excellence
3. Quality faculty in discipline expertise
4. Departmental journal club
5. Breadth and depth of research disciplines
6. Revenue to cost performance
7. Strong interaction with WPAFB and local industry
8. Nationally recognized Masters Program
8. Strong link to science, particularly chemical education
9. Strong outreach chemical education program (Chem. Demo) and national tours reaching 8,000 students locally, as well as national audiences
10. Breadth of pre-professional education (medical, dental, veterinary, pharmacology, nursing)
12. Value-added impact on student exposure to science and chemistry for students who are not technically oriented

Earth and Environmental Sciences

1. Diversity of our technical and content knowledge
2. Efficient size of the department
3. 30-year national accreditation history of the environmental program
4. Multiple faculty specialties in graduate programs
5. Interdisciplinary and collaborative environment
6. Applied focus of the department
7. History of successful alumni
8. National reputation in hydrocarbon industry and environmental consulting industry
9. Access to Ph.D. program
10. Strong research programs
11. Unique MST program and Geoscience education breadth of expertise
12. Creation of publishable research
13. Quality field and lab facilities
14. Distance learning opportunities

Strengths of Core Capabilities (continued)

Mathematics and Statistics

1. Strong research faculty given we do not have a Ph.D. program
2. Overall quality of both graduate and undergraduate programs
3. Favorable class sizes with fewer than 45 students
4. Strength of our outreach in mathematics education with local school districts
5. Strength of the statistical consulting center outreach to external clients
6. Excellence of the masters level program in Applied Statistics
6. Dedication of our teaching staff
7. Quality of instructors and lecturers and their flexibility in teaching a variety of classes
8. Quality of the middle school mathematics education program
9. Strength of faculty and staff knowledge in statistical and mathematics software
10. Collegiality of the department
12. Use of latest technology for on-line classes for general education requirements

Neuroscience, Cell Biology, and Physiology

1. #1 in extramural research rewards in CoSM and among basic science departments in the School of Medicine.
2. Masters Programs serve as recruitment tool for School of Medicine and the BMS Program.
3. Contribute to innovative summer undergraduate programs for diverse students which benefit recruitment.
4. Unique educational scholarship capability of the faculty.
5. Deep involvement in creation, design, and delivery of the curriculum.
6. Recognized world authorities in neuroscience, cell biology, and physiology.
7. The history of training for successful scientists in labs (mentoring and advising process).
8. High profile success of our student graduates.
9. Extensive generation of educational learning tools for peer colleges and universities (media, pedagogy).
10. The good working relationship between the two deans and colleges.

Strengths of Core Capabilities (continued)

Physics

1. Well-regarded teaching as referenced by students
2. Well-established teacher education efforts
3. Unusual laboratory capabilities (accelerators, high resolution spectrometers, materials preparation equipment)
4. Breadth of our interdisciplinary projects with:
 - Engineering
 - Biology
 - Environmental Science
 - Geophysics
 - Teaching
 - Chemistry
5. Quality of output in research and external funding among departments without a Ph.D. program
6. High level of professor-to-student contact in both classroom and projects at undergraduate and graduate levels
7. Collegial environment of the department
8. Gender diversity of our faculty

Strengths of Core Capabilities (continued)

Psychology

1. Popular undergraduate major with new curriculum
2. Strong applied focus in Industrial/ Organizational, Human Factors, Developmental/Psychobiology, etc.
3. One of the largest programs in the nation with a very distinctive Industrial/ Organizational Human Factors combination
4. Very strong blend of basic and applied research with basic research driven by applied problems
5. Strong training of undergraduates for graduate work in all disciplines
6. Quality of curriculum in Bachelor's programs with research base
7. Unique placement of the department in a College of Mathematics and Sciences
8. Practicum and service learning for undergraduates
9. Undergraduates can get publishing and conference presentation experience.
10. Experiential base of lab experiences in behavioral neuroscience program
11. Strength of our graduate applicant pool
11. Level of activity of 60 Ph.D. students
12. Highest level of return of research dollars to the college
13. Strong scientific base of the faculty
15. Strong teaching skills and rigorous standards of the faculty
16. Largest number of undergraduate major hours in the college
17. Strong national visibility of the faculty in professional societies, editorial boards, and granting agencies
18. Degree of integration of the department with the local community (extent of employment of our graduates)
19. Unique place of the department in collaborative efforts across the university to assess human and technological interaction
20. Collaborations with women in science
21. Strength of the office staff

Strengths of Core Capabilities (continued)

Science and Mathematics Educators

1. Practice, experience, and expertise in content and pedagogy learning of teachers
2. Content knowledge in teacher education of science and mathematics
3. Capability to build research experiences for graduates and undergraduates based on our discipline-specific “home departments”
4. Dual appointments in the College of Education and CoSM
5. Span of five content departments, teacher education, and two colleges
6. Collegueship of science educators and scientists (department specific)
7. Unique programs at Bachelors and Masters levels in mathematics and science education (for middle childhood teachers)
8. Strong partnerships with other higher education institutions, ODE, OBR, and school districts in the region
9. State-wide reputation of middle childhood education and regional collaborations
10. National reputation for discipline areas and the structure of our programs
11. College involvement in National Network for Educational Renewal
12. Collaborations with other research institutions
13. State-wide reputation for high quality professional development
14. History of attracting funding for professional practice
15. Access and control of data sources related to teacher preparation

Weaknesses of Core Capabilities

As part of the overall core capabilities assessment, the faculty of CoSM departments identified the following current weaknesses of their departmental core capabilities. The following profile represents the non-prioritized view of weaknesses by department.

Biochemistry and Molecular Biology

1. **Small faculty size relative to departmental teaching mission and medical school Biochemistry and Molecular Biology Departments**
2. **Faculty demographics and diversity:**
 - A disproportionate number of faculty at senior academic ranks
 - Under representation by minority and female faculty
 - Limited mentoring of junior faculty
3. **Space limitations and locations:**
 - Limited space in new science building for new faculty
 - Off-campus location of Magnetic Resonance lab and faculty
4. **Non-uniformity of faculty appointments:**
 - 12-month versus 9-month appointments
 - Tenure track and non-tenure track faculty
 - Bargaining unit and non-bargaining unit faculty

Weaknesses of Core Capabilities

Biological Sciences

1. Limited size of faculty in relation to course offerings
2. Overall student to faculty ratio
3. Teaching lab limitations
4. Limited graduate financial and TA support for students and diminishment of Masters program
5. Attractiveness to new graduate students
6. Lack of student community
7. Engagement of alumni
8. Limited greenhouse capability
9. Physical capacity; equipment support in labs
10. Service contracts for instrumentation (technical support for shared equipment)
11. Computational and network flexibility for research
12. Incentives and institutional support for commercialization
13. Post-doctoral support (financial and facility)
14. Open enrollment mandate and the consequences for students and faculty
15. Faculty start-up support (financial, facility, student assistants, etc.)
16. University overhead allocation and processes
17. Lack of graduate level only courses
18. Limited faculty capability in:
 - Cell Biology
 - Immunology
 - Microbiology
 - Exercise Physiology
 - Genetics
 - Animal Behavior
19. Competitiveness for resources with medical school (shift from programmatic to research competition funding)
20. Limited conference and meeting capacity
21. Lack of formal protection of campus woods

Weaknesses of Core Capabilities (continued)

Chemistry

1. Coverage of courses as a small department
2. Insufficient faculty size by Ohio Board of Regents Standards
3. Lack of modern equipment with no maintenance or replacement policy
4. Student recruitment limitations based on lack of equipment
5. Cost competitiveness by Sinclair Community College in first two years of study
6. Difficult student recruitment for Master of Science programs
7. Lack of instrument technician
8. Limited recruitment processes employed by the Department

Earth and Environmental Sciences

1. Lack of basic instrumentation
2. Limited critical mass of faculty in key areas (i.e., geophysics, watershed processes)
3. Limited office support to faculty
4. Diminished pool of high quality students
5. Fewer students seeking science careers
6. Limited alumni and development program
7. Process of facilitating use of lab fees for new investment
8. Transitioning to a new departmental identity
9. Space limitations for new faculty despite the renovation underway

Weaknesses of Core Capabilities (continued)

Mathematics and Statistics

1. Marginal staffing for breadth and frequency of course requirements
2. Limitation in number mathematics education faculty until pending hires are completed
3. Over-reliance on graduate students and adjuncts for entry level classes
4. Need for Professional rank faculty to teach pre-calculus courses to enhance the quality of calculus instruction
5. Limited number of graduate students and small size of the graduate program
6. Level of flexibility and financial support for graduate students
7. Limited releases for research and sabbaticals
8. Retention of high quality instructors
9. Levels of multiple responsibilities of faculty
10. Limited access to technical support personnel for labs, software, presentations, and document development
11. Insufficient availability of well-equipped and appropriate sized classrooms (i.e., blackboards)
12. Inadequate faculty staffing level in the statistics program
13. Lack of quality graders and lab assistants
14. Limited resources for faculty travel

Neuroscience, Cell Biology, and Physiology

1. Low level of resources for Masters and Ph.D. programs.
2. Inadequate public promotion/awareness of the biomedical research mission at WSU.
4. Failure to attract a sufficient number of strong graduate students.
5. Low salaries for instructors and full professors as compared to AAMC guidelines.
6. Limited ongoing development of faculty beyond initial recruitment which influences the retention of talented people.
7. Limited presence of junior faculty in the department.
9. Non-contiguous space of faculty offices laboratories (faculty spread out in multiple buildings).
10. Very little translational (bench to bedside) research capacity.

Weaknesses of Core Capabilities (continued)

Physics

1. Physical limitations of classroom, teaching, laboratory, research office space, student work space
2. Curriculum established when the department was organized (standard problem across the nation)
3. Limited medical physics course capability
4. Limited number of student majors and graduate students
5. Non-aggressive recruitment efforts
6. No Ph.D. program in physics which drives external support for research and quality students
7. Relatively lower compensation levels than other colleges at WSU and other universities
8. Low start-up funds for new faculty research
9. Non-integration of teacher education program with core physics program
10. Unexamined pedagogy without verification
11. Need for additional faculty lines, enabling available faculty research time
12. Inflexible and limited teaching assistantships which restrict recruitment

Weaknesses of Core Capabilities (continued)

Psychology

1. Heavy reliance on adjunct faculty for undergraduate program with both day and evening full course offerings (50% of courses taught by adjuncts) significantly below state recommendations for equivalent FTE's
2. Inadequate level of personnel to handle the growth in size of the undergraduate and graduate programs
3. Limited access to graduate students for Behavioral Neurosciences
4. Inadequate levels of support staff
5. Different levels of access to graduate students and resources for faculty with same standards for tenure
6. Current demands for faculty teaching loads limit service potential, future planning, and potential to collaborate within the department
7. Diverse range of preparation among undergraduate students for college work
8. Need to balance strength across graduate concentrations for staffing
9. Strong "anti-clinical" bias of the department and limited ties with School of Professional Psychology
10. Tension between undergraduate and graduate program for resources
11. Attrition of Ph.D. students prematurely due to job opportunities at Master's level
12. Limited research facility capacity for Behavioral Neuroscience Research on animals to remain current with NIH standards
13. Limited technical support in lab areas (especially computer resources)

Weaknesses of Core Capabilities (continued)

Science and Mathematics Educators

1) Limitations on Research and Professional Development Infrastructure

- a. Limited research infrastructure to do large scale research, especially on student achievement involving K-12 students
- b. Lack of sufficient support infrastructure for grant, professional development, and MST programs
- c. Limited support resources to do research (i.e., space, financial support, graduate students, lab space, equipment)
- d. Limited support for graduate students, including financial support, assistantships, etc.
- e. No Ph.D. program track in mathematics and science education influencing research opportunities

2) Identity, Resources, and Priority of Math and Science Education Faculty

- a. Lack of clearly-defined governance structure of programs
- b. Inadequate representation in the college
- c. Differing levels of support and expectations among departments with inconsistent expectations (i.e., teaching loads)
- d. Different priorities between colleges and among departments
- e. Difficulty in communication among the group of science and mathematics educators
- f. Multiple demands on math and science educators
- g. Different priorities and emphasis across science and mathematics educators as a group
- h. Limited collaborations and interactions with departmental colleagues on issues of education

3) Program Attrition, Retention, Recruitment, and Student Support

- a. Limited resources and grant opportunities for tuition of pre-service teachers, especially in their fifth year and also for MST students
- b. Limited assessment of college course offerings of colleagues and impact on the practice of our departments
- c. High attrition rate between Bachelors and post-Bachelors Licensure program
- d. Low numbers in Adolescent and Young Adult (AYA) Baccalaureate Program
- e. Majority of field education experiences are late in the fifth year
- f. Lack of early identification of prospective AYA students, including courses, field experiences, and advising.
- g. Limited support for post-Graduate Licensure Program

External Threats

A series of external threats have been identified for the future of the CoSM departments at WSU. Threats refer to those significant factors or trends in the environment that could seriously impair or erode the capabilities of CoSM departments preventing them from being effective over the next five years.

Biochemistry and Molecular Biology

External Threats (Viability or Effectiveness)	Level of Significance
1. Decline in extramural support from national funding organizations	H
2. Continued erosion of state support for Ohio universities	H
3. Inadequate support for advanced degree training	M
4. Local and state-wide misperceptions about educational institutions	L

External Threats

Biological Sciences

External Threats (Viability or Effectiveness)	Level of Significance
1. State funding for higher education, specifically for WSU	H
2. Projected limited funding from National Institute for Health and National Science Foundation	H
3. Lack of plan at university level and college level to support research infrastructure and vision, including funding, endowments, contracts for service, facilities, etc.	H
4. Insufficient university fundraising capacity linked to research support	H
5. No long-term planning or vision for broad integrative capacity- building for faculty positions	H
6. Public perception (including the media) of importance and visibility of research at WSU	H
7. Eroding support for graduate programs and lack of cohesive plan for awarding of financial support for graduate students, especially Ph.D. students	H
8. Significant downsizing of Air Force Institute of Technology and WPAFB	M
9. Continued engagement of local school district support for the placement of WSU students	M
10. Recruiting quality students and faculty with overall attractiveness of Dayton and Ohio as a place to live and work	M
11. Percentage investment in open enrollment practices and consequent resources for remedial work	M

External Threats (continued)

Chemistry

External Threats (Viability or Effectiveness)	Level of Significance
1. Insufficient shop support, instrumentation, and research infrastructure	H
2. Uncertainty of lab renovations and movement of labs with limited collaboration and communication (lack of input)	H
3. Unrealistic expectations versus institutional support available	H
4. Increased competitiveness for masters student recruitment with Ph.D. programs	H
5. General library cutbacks	M
6. Local and Ohio economic conditions	M
7. Stagnation in federal research grants and support	M
8. Start-up of University of Dayton Masters in Chemistry	L

External Threats (continued)

Earth and Environmental Sciences

External Threats (Viability or Effectiveness)	Level of Significance
1. Access to research funding	H
2. Funding support for graduate students	M – H
3. Decreased state funding for universities, especially for instrumentation and tuition support	L
4. Close location of larger research centers (i.e., OSU)	L
5. Uncertainty in regulatory and economic environment on environmental industry	L – M
6. Basic level of science requirements in state of Ohio with new standards emerging	L
7. Popular beliefs and trends in creationism as science among students and communities	L

External Threats (continued)

Mathematics and Statistics

External Threats (Viability or Effectiveness)	Level of Significance
1. Reduction in regular tenure track faculty and replacement by part-time/adjunct faculty, lecturers, and instructors	H
2. Reduction in mathematics requirements throughout the university	H
3. Admissions of under-prepared students consuming faculty investment	H
4. Pressure to grant favorable grades, student performance notwithstanding	H
5. Continued state reductions in support of higher education	H
6. Pressures to increase teaching loads of faculty	M
7. Mathematics and statistics courses taught by other departments	M
8. Diminishing the value of the research mission of the department	M
9. Support of university and college administrators for research and teaching activity of faculty.	M
10. Competition by on-line universities and community colleges	M

External Threats (continued)

Neuroscience, Cell Biology, and Physiology

External Threats (Viability or Effectiveness)	Level of Significance
1. Low exposure and knowledge of WSU.	H
2. Continued decline in NIH funding.	H
3. Continued decline in state funding.	H
4. Perception and size of medical school graduates at OSU and the University of Cincinnati can dwarf our bio-medical mission.	M-H

External Threats (continued)

Physics

External Threats (Viability or Effectiveness)	Level of Significance
1. Commitment of State of Ohio support for higher education with a high cost of tuition and low state support	H
2. Stable, but low number of physics students at both major and graduate levels	H
3. Proliferation and expansion of administrative cost and structure	H
4. Reduction in service load with physics classes taught by engineering	M
5. Challenges to acquire external funding for research projects based on the cultural change from pure physics to interdisciplinary physics. Funding agencies are now interdisciplinary.	M
6. Overall faculty acceptance of science education program as a mission of the college	L
7. Expanded expectations among students for services and general education which are non-academic	L
8. Lack of preparation and retention of high school students for science and mathematics	L
9. Loss of departmental research affiliate of the Semi-Conductor Research Center	L

External Threats (continued)

Psychology

External Threats (Viability or Effectiveness)	Level of Significance
1. Emerging research funding requirements for large scale inter-disciplinary research coupled with increased difficulty for lab funding. <i>This mismatch is at cross purposes with awards system for faculty.</i>	H
2. NIH and NSF funding levels are shrinking.	H
3. Diminishment of consultative environment and structure of the university in engaging and supporting faculty standards of success, growing the bureaucratic structure and disconnect between faculty and administration.	H
4. Declining state support for higher education.	H
5. Lack of university “infrastructure” to support competitive research.	H
6. Decline in local and state economy and population change with increased dependence on undergraduate tuitions.	H
7. Standards for graduating higher numbers of Ph.D. students.	M-L

External Threats (continued)

Science and Mathematics Educators

External Threats (Viability or Effectiveness)	Level of Significance
1. Legislation enabling alternate forms of licensure among ESC's and school districts	H
2. Potential requirements to document the results of improved teaching on K-12 student performance	H
3. Over-emphasis on test scores as the primary measure of student achievement	H
4. Pressure on school district results, driving a discrepancy among higher education, local school districts, and ESC's on the vision of teacher education and good teaching	H
5. Politicization of educational standards and educational reform	H
6. State-wide and national resource emphasis for high school mathematics and science education teachers exceeds emphasis on middle school teachers	M
7. State-wide pressures to weaken middle childhood licensure and low support among school administrators for middle school licensure of teachers	M



External Threats (continued)

Advisory Board

External Threats (Viability or Effectiveness)

1. **Competitiveness with other universities for top graduate students**
2. **Aggressive recruitment processes by peer universities for graduate students as compared to decentralized processes at WSU**
3. **General low interest of high school students in mathematics and sciences**
4. **Demographic trends of younger population leaving the area**
5. **Retention rate of students who come to the college without adequate preparation for college work in mathematics and sciences**
6. **Sophisticated research platforms of other universities to enhance their research capabilities as compared to WSU**
7. **National perception of higher tuition costs in Ohio**
8. **Competition from other schools with incentives for faculty with funded research**
9. **Growing sophistication of marketing by other universities**
10. **Political landscape of funding for higher education in Ohio as compared to other states (10-year decrease in funding in the state)**
11. **Wholistic and comprehensive campus experience of peer schools**



Emerging Opportunities

Emerging opportunities were identified by the CoSM Departments and those high priority areas for potential growth and development of their capabilities and services. These emerging opportunities will be reviewed and evaluated by the dean, department chairs, and directors during a follow-up strategic planning retreat to determine their priority in the future plans of the overall College of Science and Mathematics 2012: Strategic Plan.

Biochemistry and Molecular Biology

1. **New building housing Biochemistry and Molecular Biology faculty**
2. **Recruitment of a new chairperson and new faculty**
3. **Establishing research foci and collaborative opportunities within and among departments**
4. **Inter-institutional (including WPAFB) collaborative research initiatives**
5. **Growing the research capacity of the centers (Genomics Research, Cellular Dynamics, Biological Computation)**



Emerging Opportunities (continued)

Biological Sciences

1. Support and expand a concentrated capacity in ecology research to be regionally competitive.
2. Fully engage alumni and the community for college level fundraising and development.
3. Significantly enhance research infrastructure and capacity of the college.
4. Accelerate investment in B.M.S. and E.S. Ph.D. Interdisciplinary Programs aligned with national programs and priorities.
5. Accelerate outreach process and system to attract top science and math students to WSU.
6. Capitalize on our capacity of environmental genomics lab for multi-disciplinary research.
7. Sustain research interest and capacity for new, younger faculty, particularly in areas of significant national interest (i.e., aging, global warming, energy sources, environmental remediation).
8. Promote and maximize research partnerships with industry, government, BRAC, and other universities.
9. Increase level of bio-defense funding working with Data Ohio and the School of Engineering.
10. Sustain the strength of the science education program.

Emerging Opportunities (continued)

Chemistry

1. Complete hiring of departmental chair and faculty positions.
2. Develop and grow a collaborative environmental Ph.D. with enhanced capability.
3. Increase role of chemistry in bio-medical Ph.D. program.
4. Expand chemical education program to include integrated science MST program
5. Develop capability in energy and energy storage related research.
6. Enhance capacity in defense/security related chemical research.
7. Enhance capability in modeling and simulation with applications in all areas of chemistry and biology.

Earth and Environmental Sciences

1. Invest in a research infrastructure and hire new faculty in critical mass areas. This is important due to increased energy costs and climate change that will drive investments in research and training for students and alumni.
2. Increase partnerships with local, regional, national, and international environmental groups and leaders.
3. Expand the MST program through state-wide on-line and field-based intensive courses.
4. Leverage presence and awareness of science and science education opportunities, such as the NSF “Earthscope” and “Neon” programs.
5. Collaborate with local schools as a way to engage undergraduate majors.
6. Seek out BRAC realignment opportunities for environmental sciences.
7. Exploit the potential of CO₂ sequestration research opportunities.



Emerging Opportunities (continued)

Mathematics and Statistics

1. **Recruit and retain good new faculty in statistics and mathematics. The current quality of our research faculty (as evidenced by publications, funding, and credentials) provides a strong basis for attracting high caliber new faculty.**
2. **Expand the graduate program by recruiting more students with competitive GTAS and flexible tuition fellowships. Possibly support MST students by creating work opportunities in the Mathematics Learning Center.**
3. **Explore research funding for innovative projects through NSF, NSA, NIH, and defense funding.**
4. **Develop graduate and advanced undergraduate courses in support of the Ph.D. programs in the university with strong mathematics-based, or statistics-based, requirements.**
5. **Develop a wider variety of graduate courses (possibly to be offered on a rotating schedule) to support the programs within the department.**
6. **Tap into “STEM” (Science, Technology, Engineering, and Mathematics) opportunities across the society for greater funding, especially for minority students.**
7. **Expand the list of classes that the Mathematics Learning Center would offer help in.**
8. **Increase faculty use and support of on-line course creation through web-ct or course studio**
9. **Create interdisciplinary data mining capacity for Biology, Genome Project, Business Applications, Computer Sciences, etc.**

Emerging Opportunities (continued)

Neuroscience, Cell Biology, and Physiology

1. **Develop a degree-granting program to train students literate in the scientific process and able to evaluate primary bio-medical literature, but equally proficient in educational scholarship. (This would support our need for instructors in anatomy and physiology and the importance of these disciplines in the future of medicine.)**
2. **Support individual faculty who are leaders in their field to continue their contribution to international excellence in bio-medical research.**
3. **Promote our existing graduate and professional programs and our ability to educate multi-disciplinary graduates (i.e., M.D. and Ph.D.; M.D. and M.B.A.; etc.)**
4. **Support the continued growth in the number of faculty to build our research capacity and recruit graduate students.**
5. **Expand our support for the unique capacity for our bio-safety level 3 facility as a resource to bio-terrorism research.**
6. **Aggressively market WSU research and teaching capabilities nationally and internationally.**

Physics

1. **Capitalize on the investment in physical science research at the state and national level**
2. **Develop the capacity of the Environmental Science Ph.D. Program**
3. **Identify and focus on methods to teach and retain the unprepared student**
4. **Capitalize on the licensure of high school physics teachers as an opportunity for grant funding**
5. **Align CoSM programs and curriculum with state regional workforce and economic development areas (i.e., nanotechnology, applied computation, renewable energy)**
6. **Capitalize on BRAC to secure research collaborators and funding for student graduate programs (i.e., sensors)**

Emerging Opportunities (continued)

Psychology

1. **Expand the integration and collaboration of psychology undergraduate and graduate programs with School of Professional Psychology (Psy.D.)**
2. **Capitalize on the unique human factors and industrial/organizational capabilities of Wright State University in relation to AFRL, BRAC, and local industry for collaboration toward a global center on applied research psychology**
3. **Explore potential for comprehensive integrated undergraduate and graduate programs in Behavioral Neuroscience**
4. **Capitalize on the market interest with improved representation of breadth of psychological disciplines and concentrations in undergraduate programs, including student advising, exposure to research, and practicum opportunities**
5. **Fully leverage our graduate specializations to strengthen undergraduate concentrations**
6. **Capitalize on the emerging interest in research on Applied Focus of Human Interaction with other disciplines**
7. **Address staffing levels, physical laboratory, and office space required for demand of both undergraduate and graduate programs and needed collaborations**
8. **Interface the department with other departments to sustain the undergraduate program as a high priority through student advising, exposure to research, captive experiences, service learning, and practicum opportunities**

Emerging Opportunities (continued)

Science and Mathematics Educators

1. **Establish a Center for Science and Mathematics Education with the intention of:**
 - Providing visibility to CoSM's and CEHS' partnership in science and mathematics education,
 - Forming an entity for integrating science and mathematics education into the organizational structures of both colleges,
 - Defining a faculty with responsibility for oversight of interdisciplinary science and mathematics education programs and courses,
 - Allowing the science and mathematics education faculty to be represented within the colleges' governance structures where appropriate,
 - Creating a focal point for activity in science and mathematics education,
 - Serving as the locus for the infrastructure needed to support a broad range of initiatives in science and mathematics education,
 - Marketing and building relationships regionally, state-wide, and with local school districts,
 - Serving as a locus of professional practice outreach.
2. **Respond to Ohio's need for well-qualified, highly effective, high school science and mathematics teachers with a range of initiatives and program changes designed:**
 - To increase significantly the number of students intending to obtain adolescent and young adult licensure and increase the number of students completing licensure, especially middle school,
 - To strengthen markedly the preparation provided to prospective licensure candidates planning high school teaching careers,
 - To improve the articulation between CoSM's undergraduate and MST programs and CEHS' licensure programs and create multiple paths leading to licensure,
 - To support practicing high school science and mathematics teachers by providing them with regular opportunities for high-quality, research-based professional development.
3. **Within CoSM, create a research support process or structure to facilitate support for graduate students, lab space, equipment, and assistance within larger scale research projects.**
4. **Streamline the degree and licensure process and programs to facilitate degree and licensure completion matching the diverse career paths of students.**

Emerging Opportunities (continued)

Advisory Board

1. Purposefully recruit and develop prime prospective students at the BS/BA, MS/MA, and Ph.D. levels
2. Develop a pull strategy with Sinclair Community College for top students in mathematics and sciences
3. Develop the value proposition and unique marketing case for mathematics and sciences at WSU
4. Explore the synergy with aerospace medicine competency coming to WPAFB
5. Capitalize on regional job creation initiatives, positioning CoSM as a workforce training and research collaboration partner
6. Identify the partnerships, success stories, and the regional benefit of the impact of CoSM teacher education results on performance of local school districts in science and math
7. Capitalize on the base of our successful alumni for their recruitment and development support
8. Expand the fundraising and development capacity for philanthropy to CoSM for the support of students
9. Maximize exposure of successful students in peer recruiting
10. Facilitate prominent national gatherings in key academic areas for exposure to CoSM capabilities
11. Capitalize on flexible program offerings in place and those which could be developed attracting older and returning students (i.e., weekend programs, on-line classes, etc.)



Emerging Value Proposition

Emerging value propositions were developed in follow-up sessions with the faculty of CoSM departments. The emerging value proposition is intended to convey the fundamental and significant purpose and relevance of the individual departments to their key internal and external stakeholders.

Biochemistry and Molecular Biology

Biochemistry and Molecular Biology contributes the largest concentration of expertise in molecular life sciences for the university. We provide baseline core courses for the School of Medicine and School of Nursing in Biochemistry and Molecular Biology. We provide research expertise to support clinical faculty through collaborative research, consulting, training, and publications.

Biological Sciences

We develop and support society's need for multi-disciplinary life scientists through a full spectrum of Ph.D. research, research projects, undergraduate education, and alumni career development enhancing biological literacy for a sustainable world.

Chemistry

Chemistry is the central science for biology, physics, psychology, engineering, medicine, and geology – all sciences.

Earth and Environmental Sciences

The mission of the Department of Earth and Environmental Sciences is to advance the understanding of earth processes and ecosystems and to focus that understanding with challenges of resource conservation and environmental quality. We explore ecosystem interactions that involve the biosphere, lithosphere, hydrosphere, and atmosphere to provide a multi-faceted perspective for sound decision making by earth and environmental scientists, managers, and planners.



Emerging Value Proposition (continued)

Mathematics and Statistics

Mathematics and Statistics are among the few core disciplines impacting all other disciplines, contributing quantitative methods and thought processes to our students and the larger society.

We uniquely play a critical role in the preparation of teachers at all levels in the creation of quantitative literacy among students.

We address the specific needs of Miami Valley students in diverse course offerings, flexible schedules, and applied learning to other disciplines.

We advance the boundaries of mathematics knowledge, including research impacting other disciplines.

We raise the standards of Wright State graduates through rigorous standards for mathematical learning in our courses and those of other departments.

Neuroscience, Cell Biology, and Physiology

The Department of Neuroscience, Cell Biology, and Physiology is the backbone faculty for students in the first two years of the School of Medicine. We provide highly-productive laboratories which impact the future treatment of diseases. We possess a prominent research capacity in terms of funded research, professional reputation, and published contributions. We are internationally recognized for our research expertise in cell biology, physiology, and neuroscience, especially in synaptic function and spinal cord neurobiology.

Physics

Physics is a fundamental discipline for the emerging topics in engineering, technology, renewable energy, nanotechnology, and biotechnology.

We are a fundamental discipline for student quantitative problem-solving skills.

Physics teaches a unique integration of physical insight and mathematical capability, providing a powerful approach to solving scientific problems.



Emerging Value Proposition (continued)

Psychology

We provide an intersection of science with life as it is lived, relative to other sciences, human problems, organizational behavior, and research.

We represent a unique and diverse set of human behavioral science disciplines.

We are among the largest and most prominent applied psychology faculty in the world.

We are among the largest growing graduate and undergraduate programs of high quality in the university returning significant scholarly and financial value.

Science and Mathematics Educators

We enhance science and mathematics education for K-12 students, undergraduates, and practicing teachers. Our work improves student and teacher understanding of math and science and their relevance to life and work. Effective science and mathematics education develops citizens who are economically successful and bring critical thinking to the democratic process, which enriches their lives and the communities in which they live.