Strategic Plan
College of Mathematical and Physical Sciences
Revised 02/12/09

1. Introduction

The College of Mathematical and Physical Sciences (MPS) intends to use the challenges and opportunities of the next five years to build on its prior successes and to continue its pre-eminence among the colleges of The Ohio State University. Among our recent and on-going successes

- MPS faculty includes five members of the National Academy of Science (of the nine members at Ohio State)
- Earth Sciences Professor Lonnie Thompson was awarded the National Medal of Science in 2007. For studies of climate change, he and Dr. Ellen Thompson (Professor of Geography, College of Social and Behavioral Sciences) were recently awarded the 2008 Dan David Prize by the country of Israel, a prize equivalent to the Nobel Prize
- Mathematics Assistant Professor Jean-Francois Lafont and Physics Associate Professor Dongping Zhong were awarded 2008 Alfred P. Sloan Foundation Fellowships for their research
- Dr. Zhong was one of 16 promising researchers named as 2005 recipients of David and Lucille Packard Fellowships for Science and Engineering
- MPS faculty dominate the rosters of Ohio Eminent Scholars, Distinguished University Professors and university teaching and service award recipients.
- Physics and French major Jessica Hanzlik, a spring 2008 B.S. Honors graduate, was one of only 32 students nationally to be awarded a Rhodes Scholarship for graduate study at the University of Oxford, England, beginning in autumn 2008
- Since 2000, four astronomy PhD graduates and one physics PhD graduate have been awarded NASA Hubble Postdoctoral Fellowships, the most prestigious national fellowships in the field of astrophysics. Only five institutions worldwide (all of them in the U.S.) have produced more Hubble Fellows than Ohio State over this time period. For the period 2000-2008, Ohio State is tied with Harvard for sixth place on this metric
- The entering class of new MPS freshmen majors in autumn 2007 were the highest achieving new freshmen in the history of the university, with an average ACT composite score of 27.0 (90^{th} percentile nationally.) Of these new students, 53% were in the top 10% of their high school classes and 89% in the top 25% of their high school classes. Of the university's 6110 entering freshman in autumn 2007, 1710 are honors students and 6.3% of these honors students are MPS majors
- The Departments of Mathematics and Statistics are part of the revolutionary Mathematical Biosciences Institute, the only center in the country dedicated to encouraging collaboration between mathematicians, statisticians, computer scientists, and researchers in the life sciences
- The Department of Astronomy is a partner in the largest optical telescope in the world
- In FY07, Ohio State ranked 5^{th} nationally in new funding awarded from the National Science Foundation's Division of Polar Programs, funding which went to investigators in the School of Earth Science. Ohio State ranked 7^{th} nationally in new funding from NSF's Chemistry Division, which went primarily to investigators in the Chemistry Department. Ohio State ranked 6^{th} nationally in funding from NSF's Mathematical Sciences Division, which went to investigators in the Mathematics and Statistics Departments.
- IDCs have grown from $4.5M in FY02 to $8.2M in FY07

In addition, the college was awarded substantial central funding through the Targeted Investment in Excellence (TIE) program. The TIE program will frame many of the strategic priorities of the college

and completely define the priorities of some units. Astronomy and Physics have a joint priority of cosmology and astro-particle physics via the CCAPP TIE. Mathematical biology is a priority of the Departments of Mathematics and Statistics (Mathematical-Biology TIE) and condensed matter is a priority of the Department of Physics (ENCOMM-Advanced Materials TIE.) The Climate, Water and Carbon TIE will define priorities of the School of Earth Sciences and the Department of Chemistry has a role to play in the Micro-RNA TIE. This Strategic Plan will assume only modest, historic growth in development dollars to err on the side of fiscal conservatism, yet we will set lofty goals. Our goal will be to make the CWC, CCAPP, MBI and ENCOMM (Advanced Materials) TIE's self-sustaining by the time central cash support is discontinued in FY2013. The TIE's are the source of MPS "big ideas" to excite donors. Our assets include naming rights to departments and laboratories and our goal will be to raise endowments for chairs and professorships, technical staff, and graduate fellowships. Increased development activity, which is central to the aspirations of The School of Earth Sciences and the Department of Astronomy and to funding our new Chemistry buildings and the renovations of Cockins, Orton and Mendenhall, will receive additional attention and resources.

Chemistry and mathematics teach two-thirds of MPS undergraduate SCRs yet their faculty sizes are at or near historic lows and the national reputations of their doctoral programs are seriously slipping. As these two departments are crucial to the academic aspirations of the university and to MPS, stabilizing and rebuilding these departments is a strategic priority. Much of the proposed non-TIE, non-development based and non-Ohio Research Scholars Program (ORSP) faculty hiring will be limited to these departments. In this regard this strategic plan and the MPS doctoral review report submitted in January 2008 to the graduate school are completely consistent. Simply put, this strategic plan is a roadmap to rebuilding two central departments while maintaining strength in the other four units.

We view the strategic planning exercise as a necessary and indispensable road map for restoring the fiscal health of the college while preserving and enhancing our many areas of strength and staying true to our values of academic excellence.

2. Mission

The College of MPS conducts fundamental research to expand and deepen our understanding of the universe and provides world-class undergraduate and graduate instruction informed by that research.

3. Process

In September, the dean, department chairs and the director of the School of Earth Sciences began a process of consultation to develop a college strategic plan. Each MPS unit developed a strategic plan in the autumn quarter. Faculty members were involved in the development of each plan to varying degrees according to the local unit's culture. The chairs and director attended the autumn strategic planning workshop organized by Vice Provost W.M. Sherman and presented their unit plans to their peers at a half-day MPS-specific strategic planning session facilitated by Dr. Anne Massaro of Ohio State's Office of Human Resources in December. The six unit strategic plans were placed on the college website and were available to all college faculty and staff. Each unit simultaneously prepared a report to the college on doctoral education and from these a college plan was developed, submitted to Graduate Dean Osmer, and posted on the MPS website.

Each unit nominated a dean or former dean with academic roots in their discipline to serve on an external review committee (ERC). The dean appointed a six-person committee from the nominations received. One month before the ERC visited Columbus, the committee members received all six of the unit strategic plans and doctoral reports, a recent unit-specific review commissioned by Dean Freeman, and data provided by the Office of Academic Affairs. The ERC visited campus in January and sent their report to the college in February. The report was placed on the college website and each unit was given the opportunity to respond to the report. On the basis of these inputs, the college prepared a draft strategic plan. The draft document was shared with the five department chairs and school director. After receiving their input, the draft document was submitted to the Office of Academic Affairs. The draft document submitted to OAA on April 8, 2008 was released to the faculty and staff of the college and open meetings were held in late April 2008, to receive faculty and staff input.

4. Goals and Actions

The college faces a challenging era ripe with opportunities. We have great aspirations in the midst of a difficult fiscal climate. We have identified five major overarching goals for the next five years that will simultaneously advance the missions of our units and return us to fiscal solvency. Associated with each goal are steps we will take to reach them.

a. Enhance the Reputational Ranking of Disciplinary and Inter-Disciplinary Research Programs

Actions:

i. Stabilize and rebuild the faculty and doctoral programs in chemistry and mathematics using MPS controlled general fund resources. Additional focused faculty hiring will occur around strategic themes and in TIE defined areas and development opportunity areas in astronomy, earth sciences, physics and statistics.

Table 1 - Summary of Faculty Hiring Plan Contained in Strategic Plan - FY09 through FY14

FTE by Department by Year						
Year	**Yr. 1**	**Yr. 2**	**Yr. 3**	**Yr. 4**	**Yr. 5**	**Yr. 6**
Dept.	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**FY14**
Astronomy	-	-	-	-	1	-
Chemistry	-	2	1	1	1	1
SES	-	-	-	-	-	1
Math	-	2	1	1	2	1
Physics	-	-	1	-	-	1
Statistics	-	-	1	*	*	*

NOTES:

1) All numbers represent the College's current faculty hiring plan which will be reviewed annually along with the strategic plan. Unforeseen budget difficulties could result in less faculty members being hired.
2) All FTE numbers represent faculty hires at the beginning assistant level. If advanced rank faculty members are hired instead, then less total faculty members will be hired.
3) The college projects a total of 41 faculty retirements/resignations over this time period. Should fewer faculty members retire or resign, the hiring plan will be adjusted accordingly.
4) All numbers in the table are absolute EXCEPT for the Math Department, which represents a net headcount increase.
5) The table does not include hires funded by University TIE Resources or the Ohio Research Scholars Program (ORSP).
6) The Astronomy hire is the Jefferson Chair expected to be filled by an external candidate in 2013.
7) The SES hire is a College TIE match scheduled for 2014.

ii. Improve research support infrastructure by thoughtful redirection of resources.
iii. Increase retention of outstanding junior faculty through aggressive promotion policies, active and effective mentoring and provision of the support that they need to succeed.
iv. Aggressively promote faculty for awards and honors.
v. Increase the diversity of our faculty through cultivation of Ohio State students from underrepresented groups for our own faculty positions.
vi. Metrics to be used in every doctoral program will include the six-year completion rate, the ratio of RAs to TAs, the average time to graduation, and increase research expenditures per faculty member. We will benchmark against appropriate peers which will vary from unit to unit. Metrics for the undergraduate program will include the number of majors, the number of students doing undergraduate research and the first-to-second year retention rate of students in chemistry, physics, and mathematics.

b. Provide Outstanding, Innovative Academic Programs

Actions:

i. Increase faculty size in the chemistry and mathematics departments to ensure viable graduate programs and interdisciplinary research efforts.
ii. Redesign instructional delivery methods across the college to improve learning outcomes and efficiency.
iii. Reduce reliance on GTAs and in turn reduce the number of graduate students as we raise admission standards in some programs, thus decreasing time-to-degree and increasing the Ph.D. completion rate.
iv. Create new masters programs in mathematics and computational science.
v. Create undergraduate majors in high school science teacher preparation, and revise existing major programs to respond to changing demands and opportunities.
vi. Recruit, retain, and graduate larger numbers of undergraduate majors to respond to the societal need for more STEM graduates.

We will redesign our courses to recruit new MPS majors and retain STEM students and majors yet, to be fiscally conservative, this plan does not assume a large growth in SCR's. Indeed, to be prudent we will assume that recruitment and retention gains will be largely offset by the reduced GEC requirements in the new undergraduate curriculum.

The Departments of Mathematics, Physics and Chemistry are moving ahead with course redesign efforts, with unique approaches tuned to the peculiarities of each field's instructional requirements. The Department of Statistics undertook a dramatic redesign effort in its introductory course, Statistics 135, several years ago that has served to inspire institutions around the country to look afresh at ways to increase delivery efficiency and improvement in learning outcomes. The Department of Statistics is also in a position to impact students from around campus through more than its GEC offerings. The Statistics minor offers to students in, for example, the sciences, social sciences, engineering and business the opportunity to gain a more detailed appreciation for and understanding of the application of statistical techniques to

modern data analysis problems in their fields. The minor is proving increasingly popular, with 25 students graduating during the last academic year with credit for the minor.

Looking to the future, we will be exploring opportunities to create new GEC offerings in the sciences that take advantage of the closer ties with Biological Sciences resulting from the reorganization of the Arts and Sciences. During the past year we had the first offering of a science cluster entitled Before History, which combined astronomy, earth sciences and anthropology in a course designed to give students a history of the universe from its very beginnings to the emergence of humans. We are still experiencing some growing pains with this cluster, but it serves as an example of the kinds of creative endeavors that could be pursued. For example, is it possible to create a two or three quarter sequence of courses that provides a student with a relatively complete overview of modern science and societal issues, at a level that is accessible to the non-specialist? This is a challenge, but with the expertise in both CBS and MPS, the time is ripe for such a consideration.

MPS notes that it will be impacted by the work of the Life Science Task Force and the current discussions of reorganization of the Department of Biochemistry in CBS. MPS will likely support any campus-wide reorganization that leads simultaneously to a reduced number of doctoral programs of higher average quality.

c. Provide State-of-the Art Facilities and support for Research and Instruction

Actions:

i. Build a new Chemistry and Chemical Engineering Complex to house synthetic chemistry and biochemistry through a combination of state capital and development dollars (Phase I)
ii. In Phase II, retire Evans Laboratory and Johnston Laboratory
iii. Renovate Cockins Hall through redirecting operating funds and development
iv. Renovate Orton Hall and Mendenhall Laboratory in cooperation with Facilities, Operations and Development (FOD)
v. Work with FOD to ensure that the Physics Research Building is fully functional
vi. Renovate instructional spaces to provide state-of-the-art learning environments

Technical Staff Support

In the appendices we provide tables which compare the numbers of staff support per MPS unit with benchmarks. The data indicates that the level of research staff in chemistry, earth sciences, and physics are close to benchmark averages in the discipline.

The appendix details the extremely large investment in research staff in astronomy. These individuals are part of the Imaging Science Laboratory or ISL. The ISL builds telescope components for many projects including the Large Binocular Telescope (LBT) project. Building these components *reduces* the annual fee to be part of the LBT project.

d. Debt Reduction Plan

In the April strategic plan cover letter MPS wrote "In short, through a combination of laboratory fees, staff attrition and course redesign based on sound pedagogical principles, the college will run on a balanced budget in FY2012." To the authors of that statement it meant that *the annual revenue in MPS in FY2012 will be greater than or equal to its annual operating expenses in that year*. As we used these terms in the April strategic plan and in this letter, "Deficit" is the difference between annual revenue and expenditures while "debt" is cumulative and represents the total outstanding financial liability. These definitions are consistent with those used in the Proctor Report, which is why we chose to use them in this manner.

There is an important aspect to our usage of "debt" which, unfortunately, may also be a source of potential confusion. As we use it, the debt contains both past expenditures that were never paid (or more precisely, paid through deficit spending) and also past financial commitments to individual faculty members that, as yet, may be unspent by that faculty member. Even though only the past expenditures currently appear when a cash balance analysis of MPS is performed, both components of the debt are equally relevant to MPS's fiscal state of health; at the risk of redundancy, the MPS annual deficit at the end of FY09 would equal the MPS debt we report below if every MPS commitment were to be expended in the upcoming fiscal year.

In April 2008, MPS estimated that the end of year balance in FY08 would be $9m worse than that of FY07, that the FY09 end of year balance would deteriorate by an additional $4m and that this trend would continue through FY10 and then improve. In actuality, the FY08 end of year balance situation *improved* by $0.2m. This demonstrates two points; that in April 2008 our ability to anticipate the rate at which commitments are paid was quite naïve and more importantly that focusing only on the entire college's end of year balance is not sufficient for our purposes. We propose that we focus on the MPS debt instead.

Actions Proposed in April 2008:

i. Implement laboratory fees for chemistry and physics courses
ii. Incent increases in indirect cost recovery (IDC) from sponsored research
iii. Reduce instructional expenses in large courses by decreasing reliance on graduate teaching assistants (GTAs) in chemistry and physics
iv. Replace short-term lecturers with non-tenure track Ph.D.s that have a long-term commitment to undergraduate education
v. Stabilize faculty size at a sustainable level
vi. Slightly reduce staff through attrition
vii. Increase development activity and establish aggressive goals for major gifts to benefit all units but with an emphasis in earth sciences, astronomy and on capital projects

At the end of FY08 the MPS debt was $20.81m. Execution of the April Strategic Plan will lead in the short term to an increase in the MPS debt to $23.3m followed by a steady decrease in the debt to $18.0m in FY13. This does not include the estimated cost to MPS of the Smith Laboratory renovation (~$1.4m), the Physics Research Building cost overrun ($1.0m of a $4.8m problem), Jennings

Renovation cost overruns ($0.3m) and Smith to PRB relocation expenses ($0.3m). In round numbers the maximum size of the MPS debt can be estimated to reach as high as $26m.

MPS proposes that OAA assume the cash burden of telescope payments ($1.5m/year) for five years with no expectation of continuing central support beyond that date and that the Arts and Sciences provides the cash for chemistry faculty start-up costs and facility issues of $2m/year for four years with no expectation of continuing support beyond that date. This will reduce the maximum MPS debt from ~$26m to $10m over 4 years.

The April Strategic Plan programmed $5.3m in debt reduction ($23.3m to $18.0m). Retiring the remaining debt (~$5-6m) will be accomplished by modifications to the MPS April Strategic Plan as described in the next few paragraphs. The result of these combined actions will allow the MPS debt to be retired by the end of FY2013.

MPS does not believe that it can credibly *further* increase revenues through laboratory fees, indirect cost return or development activity at a faster rate than proposed in the April Strategic Plan. The April Strategic Plan has already programmed a reduction in staff (4) and teaching assistants (36) and in unit supplies and services and equipment budgets. Thus, reducing *proposed* expenditures by at least $3m is the only approach we can envision to reach the college debt reduction target.

Our April strategic plan proposed hiring faculty at an overall pace about equal to our anticipated retirements and resignations over the same time period. As Table 2 illustrates, MPS anticipates losing about 41 faculty members through FY13 based on historical trends and demographic data, representing an annual rate savings of $4.9 million. MPS plans to hire 37 faculty members, primarily at the assistant professor level, over the same time period financed by the general fund (thus the analysis excluded hires funded by TIE initiatives, the successful ORSP grants, etc.). This will add about $3.7 million in annual rate to our budget. However, this plan calls for a net savings of ~$1,159,000 in annual rate when hiring faculty at a below-replacement level.

Table 2 - Proposed Faculty Changes - FY09 Through FY13 (REVISED 11/05/08)

Additions			Retirements and Resignations			Net Changes in PBA		
Dept.	FTE	Salary & Benefits	Dept.	FTE	Salary & Benefits	Dept.	FTE	Salary & Benefits
Astronomy*	1	$ 63,850	Astronomy	-2	$ (241,930)	Astronomy	-1	$ (178,080)
Chemistry	5	$ 510,800	Chemistry	-5	$ (549,284)	Chemistry	0	$ (38,484)
SES	0	$ -	SES	-5	$ (513,916)	SES	-5	$ (513,916)
Math	24	$ 2,451,840	Math	-18	$ (2,065,832)	Math	6	$ 386,008
Physics	1	$ 102,160	Physics	-6	$ (1,027,840)	Physics	-5	$ (925,680)
Statistics	6	$ 612,960	Statistics	-5	$ (502,048)	Statistics	1	$ 110,912
Total	**37**	**$ 3,741,610**	**Total**	**-41**	**$ (4,900,849)**	**Total**	**-4**	**$ (1,159,239)**

*The Astronomy hire is the Jefferson Chair expected to be filled by an external candidate in 2013.

As for the five-year cash cost of the hiring plan, with salary, benefits and startup, MPS plans to spend a total of $14.4 million through 2013, which is comprised of $8.9 million for compensation and $5.5 million for new faculty startup

Table 2 differs from the April Strategic Plan in that it spreads the same number of faculty hires over 5 years instead of 4. To reduce the debt as shown in table 2, MPS now plans to delay 3 faculty hires until

2014, delay 3 previously programmed hires by 1 year, reduce an additional 4 staff positions through attrition, and sell LBT observing nights over a 3 year period (FY11-13). These steps are projected to produce a total savings of over $11.1 million ($3m above the target) by the end of FY13 as illustrated below in Table 3.

Table 3 - Additional Cash Savings in Strategic Plan; 2010-2013 (Dollars in Thousands)					
Item	**Compensation**	**Start-up**	**Other**	**Total**	**Comment**
1 ENCOMM Physics Hire pushed to 2014 (1 years cash savings)	$ 102	$ 900	$ -	**$ 1,002**	1 year compensation savings
1 Chemistry Hire pushed to 2014 (3 years cash savings)	$ 305	$ 800	$ -	**$ 1,105**	3 years compensation savings
1 Earth Sciences TIE Hire pushed to 2014 (1 year cash savings)	$ 170	$ -	$ -	**$ 170**	1 year compensation savings
2 Math Hire pushed back 1 year (2011 & 2012)	$ 200	$ -	$ -	**$ 200**	2 years of compensation
1 Statistics Hire pushed back to 2011	$ 100	$ -	$ -	**$ 100**	1 year compensation savings
4 Additional Staff Attrition over 4 years	$ 800	$ -	$ -	**$ 800**	Cash savings 2010-2013
Selling 31 LBT Nights over FY 2012 and 2013*	$ -	$ -	$ 2,604	**$ 2,604**	$84k per night
Total	**$ 1,677**	**$ 1,700**	**$ 2,604**	**$ 5,981**	**Target > $3 Million**
Deficit Reduction in Updated Strat. Plan Submitted 9/5/08				$ 5,163	
Total Deficit Reduction in New Strat. Plan				**$ 11,144**	

*Should we be unable to sell all 31 nights, additional hires scheduled within our strategic plan will be postponed.

We must admit that it is not clear that the Large Binocular Telescope will be fully operational by 2012 and, if so, what kind of market will exist for selling OSU's allotted observing nights. Finally, it is important to note that we have already bartered away many observing nights in the future to minimize financial obligations. We also expect to exchange more nights for cash, thus this tactic may be partially or fully exhausted in FY12, and of course we must save some nights for science. Table 4 provides the revised GFSA cash flow projection incorporating the revised savings plan as described above.

Table 4 - Strategic Plan Financing FY09 - FY13 (GFSA Budget Only - Excludes Central TIE Funding)

Sources						
	FY09	**FY10**	**FY11**	**FY12**	**FY13**	**Comment**
PBA (FY09 Includes 1st yr. of lab fees)	$ 72,694,313	$ 74,875,142	$ 77,121,396	$ 79,435,038	$ 81,818,089	3% per year + IDC incent
OAA Support	$ 2,700,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$1.5M per year for 5 years for LBT support
Arts & Sciences Support (Faculty in FY09)	$ 181,721	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$2.0M per year for 4 years for Startup and Facilities
Selling a total of 31 Nights of LBT time	$ -	$ -	$ -	$ 1,260,000	$ 1,344,000	$84k per night; 1/3 of total nights per year
Chem Lab	$ -	$ 750,000	$ 1,500,000	$ 2,250,000	$ 2,250,000	$50 per yr. up to $200
Physics Lab	$ -	$ 383,500	$ 767,000	$ 1,150,500	$ 1,150,500	$50 per yr. up to $200
Total	**$ 75,576,034**	**$ 79,508,642**	**$ 82,888,396**	**$ 87,595,538**	**$ 90,062,589**	
Uses						
	FY09	**FY10**	**FY11**	**FY12**	**FY13**	
Faculty Salary	$ 22,335,378	$ 23,837,828	$ 24,672,152	$ 25,535,678	$ 26,429,426	3.5% per year
Faculty Additions - Salary & Benefits	$ -	$ 827,917	$ 1,772,008	$ 2,835,937	$ 3,875,210	
Faculty Retirements/Resig.	$ -	$ (735,000)	$ (2,107,000)	$ (3,479,000)	$ (4,900,000)	
Staff Salary	$ 9,881,619	$ 9,975,196	$ 10,324,328	$ 10,685,680	$ 11,059,679	3.5% per year
Staff Attrition	$ -	$ (160,000)	$ (320,000)	$ (480,000)	$ (640,000)	= 8 $60k staff positions
General Funds GA Stipends	$ 8,762,104	$ 8,672,253	$ 8,975,782	$ 9,289,934	$ 9,615,082	
General Funds GA Fee Auth	$ 5,116,178	$ 5,406,000	$ 5,730,360	$ 6,074,182	$ 6,478,632	6% increase per year
GTA Attrition	$ -	$ (245,250)	$ (490,500)	$ (735,750)	$ (981,000)	9;9;9;9 - 36 Total Net Decrease
Other Specials (Lecturer's, etc.)	$ 5,014,737	$ 4,825,313	$ 4,825,313	$ 4,825,313	$ 4,825,313	
Employee Benefits	$ 11,163,186	$ 11,763,954	$ 12,469,791	$ 13,217,978	$ 14,011,057	6% increase per year
Supplies & Services	$ 4,727,202	$ 4,643,224	$ 4,643,224	$ 4,643,224	$ 4,643,224	
Equipment	$ 890,153	$ 786,192	$ 770,469	$ 755,059	$ 739,958	Decrease offset by IDC decentralized to depts.?
Freeman Dept. Cash Commitments	$ 1,126,431	$ 683,045	$ 510,600	$ 297,229	$ 190,000	
2/3rds GRA Fee Auth. Reimbursement (Final yr)	$ 1,011,863	$ -	$ -	$ -	$ -	FY09 Final Year - College transfer; not an expenditure
Remainder of IDC Cash Available for Start-up	$ -	$ 1,171,224	$ 1,343,669	$ 1,557,040	$ 1,664,269	Used in New addition startup
IDC Reconciliation	$ 185,088	$ -	$ -	$ -	$ -	
Central University Assessments	$ 350,000	$ 350,000	$ 350,000	$ 350,000	$ 350,000	Assume assessment to follow SIS
Bio Sci Communications	$ 65,000	$ 65,000	$ 65,000	$ 65,000	$ 65,000	
MOUs with Other Colleges/Units	$ 834,648	$ 834,648	$ 834,648	$ 834,648	$ 834,648	
LBT	$ 1,900,000	$ 1,900,000	$ 1,900,000	$ 1,900,000	$ 1,900,000	9.5M over 5 years
FY08 LBT Payment in FY09	$ 654,750	$ -	$ -	$ -	$ -	
MBI Support	$ 440,000	$ 440,000	$ 440,000	$ 440,000	$ 440,000	NSF Grant Renewed?
Other Department Expenses	$ 484,085	$ 484,085	$ 484,085	$ 484,085	$ 484,085	
TIE Support to ENCOMM	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	Post doc support in addition of 1.5 Fac FTE
TIE Support to CCAPP	$ -	$ -	$ 500,000	$ -	$ -	
TIE Support to CWC	$ -	$ 140,000	$ 140,000	$ 140,000	$ 140,000	200k less Howat position; lower by fac hire in 2012?
Other Departmental Support	$ -	$ 150,000	$ 100,000	$ 50,000	$ -	
Smith Lab Basic Renovation (MPS Portion)	$ -	$ 1,400,000	$ -	$ -	$ -	Uncertain as to when transfer will be required
PRB Overruns	$ 830,000	$ -	$ -	$ -	$ -	May be offset by local funds available within Physics
Jennings Project Overrun	$ 300,000	$ -	$ -	$ -	$ -	Maximum amount; real amount could be lower
Cash Match for Basic Ren. In Johnston & Evans	$ 1,425,000	$ -	$ -	$ -	$ -	Timing issue; May not transfer until 2010.
Total	**$ 77,597,423**	**$ 77,315,630**	**$ 78,033,928**	**$ 79,386,236**	**$ 81,324,584**	
Sources Less Uses	**$ (2,021,389)**	**$ 2,193,012**	**$ 4,854,468**	**$ 8,209,302**	**$ 8,738,006**	

Cumulate College Deficit 6/30/08 = $17.5M	**$ (22,771,389)**	**$ (20,578,377)**	**$ (15,723,909)**	**$ (7,514,607)**	**$ 1,223,398**	
Estimated Dept. Deficits = $3.3M					**$ 23,994,788**	**Deficit decrease amount FY09 to FY13**

e. Achieve Financial Transparency and Efficient Use of Revenues

Actions:

i. Establish sound and understandable budget distribution principles, including the development and use of a formula for such distribution that is based on optimization of the following principles; (a) transparency, simplicity and predictability, (b) identifying and funding of college-centric priorities (c) setting high but realistic performance goals based on objective measures that encourage and support the aspirations of six diverse units, (d) devolving additional authority and responsibility to the department chairs and school director to meet performance goals and (e) rewarding high unit performance as defined by objective measures.

ii. Return all post-tax IDC funds to the generating units to support research infrastructure and faculty startup and retention costs by FY2014. Historically MPS chairs and faculty have not been forced to make fiscal decisions. Departments have been trained to become proficient in advocacy rather than strategic investment. Furthermore, unit budgets were never tied to IDC recovery. As a result MPS units spent more energy on internal to OSU competitions than competing for external funding. The college feels that to change this culture we must give units an incentive to improve their external funding by allowing them to decide how to reinvest it in their research infrastructure.

iii. Retain annual rate from faculty retirements or resignations in the college for strategic reinvestment, while allowing units to keep the annual rate generated from negative tenure decisions, staff and GTA reallocation. In the past MPS did a poor job of explaining to units the principles upon which their budgets were based. This led to feelings of both grievance and entitlement. Chairs were unable to predict their budgets, nor was there an understandable link between the spending decisions of units and their consequences. To change the culture MPS seeks to distribute resources to units based on transparent principles. As part of the culture change MPS needs to give chairs incentives to seek efficiencies in their operations by allowing them to reallocate the savings realized to another part of their budgets.

iv. Support priorities of the college that are not accommodated by the college internal distribution formula, such as the Large Binocular Telescope, Byrd Polar Research Center, The Institute for Materials Research and Interdisciplinary Graduate Programs.

v. Require units to align the size and cost of their programs with their revenues to defined values.

5. Priorities and Performance Goals by Unit

a. General Considerations

MPS contains six units. Every unit is strong and central to the university (Table 5). Most Ohio State students take a course in mathematics or statistics. Over half of OSU's undergraduates take a course in Chemistry and over a quarter take a course in Physics by the time of graduation. Although SCRs in Astronomy and Earth Science are small, these are distinguished units. Thus, it is essential that all six MPS units continue to thrive. Declines in any unit will have negative consequences for all units and for the university.

Table 5 National Rankings of MPS Units

	USNWR 2006/07/08	%	1992 NRC	%
Astronomy	N/A	N/A	23/33	70[(c)]
Chemistry	28/91	30	22/168	13
Mathematics	33/99	33	29/139	21
Physics	26/105	25	24/147 [(a)]	16
School of Earth Sciences [(a)]	43/81	53	45/100	45
Statistics [(b)]	N/A	N/A	29/65	45

(a) ranked as Geoscience
(b) ranked as Statistics and Biostatistics
(c) many weak astronomy divisions are absorbed into Departments of Physics; thus this ranking gives a misleading impression. Statistics suffers from the same issue-the difference in the comparison group relative to large units

This does not mean that differential investment in MPS units is undesirable or impossible. As shown in Table 6, MPS *does* currently distribute resources to units differentially and the level of differential funding has dramatically increased between FY2002 and FY2007. We feel that this trend is unhealthy and unsustainable and that the levels of differential funding were closer to optimum in FY02 than in FY07.

Revenue (R) less Expenses (E) 2002-2007
Contribution Minus Actual Expenditures Pre-Central and College Taxes
Table 6

	FY02 Δ (R-E)	FY07 Δ (R-E)
MPS Administration	-1.2M	-1.9M
Astronomy	-1.6M	-2.9M
Chemistry	35K	-2.6M
Earth Science	-1.3M	-2.1M
Mathematics	2.7M	5.8M
Physics	-2.3M	-5.5M
Statistics	40K	600K

Given the amount of SSI and tuition returned to MPS, we calculate that the *maximum* number of tenure track faculty we can support with tuition and state share of instruction (SSI) is ~220 FTE. We recently invited an external review team to campus and charged them with recommending the optimal distribution of faculty in MPS consistent with a top 20 NRC ranked doctoral program in every unit. Their recommendations are given in Table 7. It is not possible to move quickly to the optimum distribution, but this analysis, along with our priorities including, in particular, our TIE programs will inform the use of annual rate vacated by faculty attrition. We feel that MPS should continuously analyze the optimum distribution of faculty but in the short term, chemistry and mathematics will gain faculty, astronomy, earth sciences, and physics will experience small decreases in the size of faculty supported by MPS controlled tuition and SSI dollars, and statistics will either stay the same size or expand as allowed by increases in their SCR growth. Note that this rebasing involves faculty TIU

supported solely by tuition and SSI. It does not reflect new faculty supported by OAA-TIE, ORSP and development activity.

Table 7 Faculty Size in MPS, Winter Quarter 2008

UNIT	FTE	TIU	Pass Through/ TIU [a,g]	External Review [a]
Astronomy	16.75 [b]	18	11	15
Chemistry	33.49 [c]	34	53	36
Mathematics	59.20 [d]	60	75	65
Physics	55.38 [e]	57	44	52
SES	27.81 [f]	31	13	28
Statistics	25.25	25	24	24

(a) Assuming 220 TIU = 220 FTE and distributing based on each units' percent of total college revenue
(b) Osmer 1.0 FTE in the grad school
(c) Platz 1.0 FTE (college), Gustafson 0.50 (ASC), Woodward .09 (CoM)
(d) McNeal 0.5 FTE (college)
(e) Andereck 1.0 FTE (college)
(f) Carey 0.5 FTE (college)
(g) These numbers are obtained by multiplying the ratio of the (total revenue each unit generates from teaching and IDC recovery)/(total college revenue) by 220

b. Undergraduate Program

We propose that by September 2012 the number of MPS majors will increase as follows: Astronomy will increase its number of undergraduate majors from 33 in autumn 2007 to 54. Chemistry will increase its number of undergraduate majors from 311 in autumn 2007 to 600. Computer Information Science will increase its number of undergraduate majors from 124 in autumn 2007 to 160 and its pre-CIS majors from 145 to 200.Earth Sciences will increase its number of undergraduate majors from 66 in autumn 2007 to 125. Physics will increase its number of undergraduate majors from 230 in autumn 2007 to 250. Math had 313 undergraduate majors and Actuarial Science had 150 undergraduate majors in autumn 2007. Both programs have grown recently, but are near capacity.

By September 2012, the fraction of female MPS majors will increase from 29.1% to 35%.
By September 2012, the number of minority MPS majors will increase from 12.9% to 15%.
By September 2012, the retention rate to the second year for MPS majors will increase from 41% to 60%.

c. Graduate Program

The six-year graduation rate of doctoral students will increase as described in each unit.
The time to candidacy and degree will decrease as described by each unit. The ratio of GRAs to GTAs will increase and the years spent by students as TAs will decrease, as described by each unit.

d. Departmental Goals and Metrics

Department of Astronomy

We have divided this list of metrics into two parts: "comparative metrics," which we can track for other departments as well as our own, and "absolute metrics," which we can track for ourselves but cannot readily track for other departments. The most informative metrics are generally in the second category, so we propose to track them to gauge our performance against our own "absolute" standards but not to tabulate them for other institutions. During the recent NRC data collection process, we found that it often took several iterations to get even the data on our own institution assembled accurately, so it is somewhere between impractical and impossible to do it simultaneously for a substantial set of benchmark institutions.

Many of our metrics focus on the graduate program. This focus is partly because one of our three strategic goals is "To have the best astronomy graduate program in the country." In addition, our success in recruiting incoming students and placing our graduates is probably the most significant indicator of how the overall research performance of our department is regarded within the field.

I. COMPARATIVE METRICS

We take as our comparison group the best university-based astronomy and astrophysics programs in the country: Arizona, UC Berkeley, Caltech, Colorado, Cornell, Chicago, Harvard, Hawaii, Johns Hopkins, UCLA, Michigan, MIT, Penn State, Princeton, UC Santa Cruz, Texas, Washington, Wisconsin, and Yale. The precise membership of the "top 20" is of course debatable, but we think this list (plus Ohio State) includes all institutions that most astronomers would rank in the "top 10."

In our own assessment, we currently rank in the upper half of this list as a research department and in the upper third of this list in the quality of our graduate program.

1. Bibliometrics

Using the NASA ADS data base, we will track:

- Publications per faculty member
- Citations per faculty member
- Citations per paper

Each statistic will be computed over the past five years, past ten years, and cumulative. We will include only papers that are co-authored by a faculty member, as it otherwise becomes impractical to calculate these statistics for other institutions.

Goal: In the 5-year and 10-year statistics, we want to be in the upper 1/2 of the comparison list, preferably the upper 1/3.

2. Hubble Fellows

We will track the number of Hubble Fellowships accepted by current and former OSU Astronomy graduate students. Hubble Fellowships are the "gold standard" of U.S. astronomy postdoctoral fellowships. Because of small numbers, this is a stochastic metric, and the broader placement metric defined in II.1.a below is more reliable, but we cannot track that metric for other programs.

Goal: Our goal is that 10% of our PhD graduates earn Hubble Fellowships. We also want to be in the upper 1/2 of the comparison list by this statistic.

3. NRC tabulated metrics

We anticipate that the NRC report will tabulate quality indicators for many U.S. astronomy graduate programs (e.g., mean GRE score of incoming students, median time to degree). While we cannot track these forward for other departments, we will have a snapshot of performance for others, and we can track them forward for ourselves. We will do so for the NRC-tabulated metrics that we consider most relevant to our strategic goals.

Goal: At the time of the NRC report, we hope to be in the upper 1/2 of our comparison group on most or all of these metrics. We wish to maintain or improve on all of them.

II. ABSOLUTE METRICS

While we cannot track these indicators for other departments, they are the quantifiable standards that most usefully track our performance relative to our top strategic goals.

1. Graduate recruiting, performance, and placement

a. Placement

Fraction of our graduating PhD students who get first postdoctoral positions at top institutions. A reasonable list to track would be: Arizona, Berkeley, Caltech, Cambridge, Carnegie Observatories, Chicago, CITA, DAO, Durham, Harvard/CfA, Groningen, IAS, Leiden, MPA Garching, MPIA Heidelberg, Oxford, Princeton, Santa Cruz, Space Telescope Science Institute, and Toronto. We would also include students getting national fellowships other than Hubble Fellowships (item 2 above), such as other NASA-sponsored fellowships, and NSF Fellowships, in this count.

We consider this the single most informative indicator of our success in providing outstanding research training to a large fraction of our graduate students.

Goal: Recognizing that many good professional opportunities are at institutions other than those above, our goal is that 1/3 of our graduating students get first postdoctoral positions at institutions on the above list and that 80% of our graduating students get postdoctoral positions at research universities, institutes, or observatories.

b. Undergraduate institutions

We will track the fraction of our enrolling students coming from elite universities and top undergraduate astronomy programs. A useful reference list is: the Ivies, Penn State, Northwestern, Arizona, Berkeley, Stanford, Caltech, MIT, Swarthmore, Haverford, and Carleton.

Many strong applicants emerge from other institutions (and many from outside the U.S.), so we would

never expect the fraction from this list to exceed 40-50% in steady state, but it is a useful indicator of our ability to attract top undergraduates to our graduate programs.

Goal: We would like 50% of our enrolling domestic students to come from these programs.

c. Recruiting success

Success of recruiting admitted students in competition with (a) Arizona, Chicago, MIT, Santa Cruz, and Washington, (b) Berkeley, Caltech, Harvard, and Princeton.

We think we should be able to run 50/50 in competition with institutions on the first list. Competition with list (b) will always be difficult because these are elite universities with long-standing reputations in astronomy, and successes will be few in absolute number, but we hope that they will grow in time. We note with regret that we are "geographically disadvantaged" relative to almost all of these institutions, as only a small fraction of prospective students consider Columbus itself a draw (and many students who turn us down mention this as a key factor in their decision).

Goal: 50/50 with respect to list (a), one success per two years with respect to list (b).

d. Publication by graduate students

Goal: By the time of PhD completion, the median student has published or submitted for publication eight or more journal articles, including at least four first-author articles.

Currently, the median number of publications by our graduate students is 9, but we are trying to reduce the time to the PhD and this will bring the number down.

e. Long-term success

Fraction of our graduating PhD students who get tenure track faculty positions at research universities within eight years of PhD.

Goal: 50% (national average is 1/3)

2. Research performance indicators

a. Number of highly cited papers authored or co-authored by department faculty. Specifically, we will track the numbers of papers with ≥50 citations and ≥100 citations.

In addition to the bibliometric indicators listed in I.1.a, isolating high-citation papers is a good way to track Ohio State leadership of and contributions to high-impact science programs. Since citations build up over time, a lower numerical threshold is more relevant for assessing junior faculty contributions. We note that citation rates are strongly field-dependent even within astrophysics.

Goal: No set goal here, but we hope the number of papers in each category grows by several per year.

b. Annual rate of journal publications authored/co-authored by department faculty, postdocs, and students.

This metric tracks the overall level of activity and productivity.

Goal: We would like to maintain or increase relative to our current rate.

c. Number of active externally funded research grants.

The number of grants is more informative about overall department performance than the total amount of funds, because the typical funding levels are highly dependent on the type of research, and the total funding in a given year can easily be dominated by the one or two largest grants. In the current funding environment, *any* successful proposal is an indication that the PI is doing high-quality, well-recognized research. This metric includes grants attached to space-based observing programs in addition to grants from regular grant programs; while grants attached to observing programs tend to be smaller, they are just as competitive, based on oversubscription statistics.

Goal: Average of 2 active grants per faculty member.

d. Number of instruments in active use on telescopes around the world. This metric tracks the productivity of our instrumentation program, which is one of the department's major components. Major instruments for large telescopes (like LBT) should be tracked separately from instruments for smaller telescopes since the timescales and level of effort are generally quite different.

For reference, a list of instruments and their current status is appended.

Goal: We would like new instruments to outnumber "retirements," so that the number of active instruments increases with time.

e. Number of faculty appointments to national and international committees or panels, including leadership roles in large scientific collaborations and membership on scientific organizing committees of international meetings.

These indicate the degree to which our faculty are recognized as important figures in their respective fields of research.

Goal: Since these appointments also come at significant cost, our goal is to maintain the current level but not particularly to increase it.

Below we place our metrics in tabular format. Please note that there are many missing data entries and some of the data entered have not been thoroughly scrubbed.

Metrics					
Comparative Metrics		Current	Average of Benchmarks	Rank	Goal for 2012
	Bibliometric: Rank vs. Benchmarks (since 2000)				
	Publications per Faculty Member	39	38.3	10	9
	Citations per Faculty Member	1415	1624	13	9
	Citations per Paper	36	41	13	9
	Graduate Quality				
	World-wide rank in Hubble Fellow production	6 (tied)	TBD		TBD
	NRC Tabulated Metrics: Rank vs. Benchmarks				
	Incoming students Mean Verbal GRE	TBD	TBD		9
	Incoming students Mean Quant. GRE	TBD	TBD		9
	Incoming students Mean Advanced Physics GRE	TBD	TBD		9
	Median Time to Degree	TBD	TBD		9
	Percentage of incoming with PhD < X years	TBD	TBD		9
Absolute Metrics		Current	Goal for 2012		
	Graduate Quality				
	Percentage of PhD graduates with Hubble Fellowships		10%		
	Percentage PhDs with prestigious postdocs		33%		
	Percentage PhDs with research positions		80%		
	Percentage incoming students from elite undergrad programs		50%		
	Recruitment success vs. elite graduate programs		1 student every 2 yrs		
	Recuitment success vs. quality peer programs		50%		
	Mean publications by graduating PhDs	9	8		
	Median first-author publications by graduating PhDs		4		
	Fraction of PhD alumni with faculty positions within PhD + 8 yrs		50%		
	Research performance				
	No. faculty papers with > 100 citations	194			
	No. faculty papers with > 50 citations				
	Annual rate of papers by faculty				
	Average number of active grants per faculty		2		
	Number active instruments or major subsystems	11	>11		

Currently active instruments or major subsystems:

OSIRIS	IR imager/spectrometer	SOAR 2.4m Cerro Pachon Chile
ANDICAM	Optical/IR imager	CTIO 1.3m Cerro Tololo Chile
Y4KCam	Imaging CCD	CTIO 1.0m Cerro Tololo Chile
CCDS	Optical spectrometer	MDM 2.4m/1.3m Kitt Peak AZ
TIFKAM	IR imager/spectrometer	MDM 2.4m/1.3m Kitt Peak AZ
RETROCAM	Imaging CCD	MDM 2.4m Kitt Peak AZ
MDM4K	Imaging CCD	MDM 1.3m Kitt Peak AZ
12-pos Filter Wheel	Subsystem	MDM 1.3m Kitt Peak AZ
KELT	Robotic CCD imager	Winer Observatory, Sonoita AZ
CrimeaCam	Imaging CCD	0.7m Crimean Astrophysical Observatory
Primary Mirror Aluminizing System	Subsystem	LBT, Mt Graham AZ

Currently retired instruments:

DANDICAM	Optical/IR imager
IFPS	Imaging Fabry-Perot Spectrograph
OSU IDS	Optical spectrometer image dissector scanner

Instruments nearing deployment:

Rigid Secondary	Subsystem	LBT, Mt. Graham
DEMONeX	Robotic monitoring telescope	Winer Observatory, Sonoita, AZ
12-position filter wheel	Subsystem	2.4m MDM Kitt Peak AZ

Instruments in current work queue:

MODS	UV/optical multi-object spectrograph	LBT, Mt. Graham AZ
OSMOS	Optical multiobject spectrograph	2.4m MDM Kitt Peak AZ

Department of Astronomy Tenure Track Faculty Standard Teaching Loads †
Data as of AY2007-2008

Institution	**Contact Hours/Year**
Illinois	86
Maryland	96
Michigan	78
Minnesota	120
Ohio State	**93**
Penn State	90
Texas	90
Washington	100
Wisconsin	75
Average	92

†Productive, non-star, non-administrative tenure track faculty

All OSU undergraduate astronomy courses are 5 credit hours and involve 5 lectures (5 contact hours/week). This corresponds to 50 contact hours in a ten-week quarter. All OSU graduate astronomy courses (with one exception) are 3 credit hours and that corresponds to 30 contact hours/quarter.

Scholarly Productivity*	**Number of Tenured Faculty**	**Teaching Load**
Distinguished/high productivity (exceeds expectations)	6	8.33 credit hours/year (83.3 contact hours/year) (~ 1 UG + 1 Grad Course/year)
Meets expectations	4	11.00 credit hours/year (110 contact/hours/year) (~1 UG + 2 Grad Courses/year)
Does not meet expectations	1	10.00 credit hours/year (100 contact hours/year) plus an administrative assignment (~2 UG courses/year)
* As defined in the MPS College Strategic Plan		

Benchmark Research Staff Support

Big Ten public or Benchmark	# of faculty (Astro only)	# faculty (joint appt.)	#grad students	# Technical staff (fte)	#IT staff
University of Illinois	9	10	31	0	1
Maryland	15	1	31	0.1	0.7
University Michigan	15	3	25	3	1
University of Minnesota	10	10	20	0	0
Ohio State University	16	6	21	9*	2
Penn State University	17	5	29	0	1.5
University of Texas	20	1	45	1.75	1.8
University of Washington	12	0	30	0	0
University of Wisconsin	13	0	27	3	0.5
Average	14.1	4	28.7	1.8	.94

Department of Chemistry

It is imperative to arrest the decline in the national ranking of the Chemistry department. A fall from 13th to 16th to 22nd to an estimated 28th in four decades constitutes a precipitous fall in the department's national ranking. The department is dangerously close to falling below a critical mass in faculty size at the same time that undergraduate enrolments are increasing. Thus, MPS plans to hire tenure track chemistry faculty at above replacement levels. The faculty to be recruited will be in 3 thrust areas: materials, life sciences and energy. The department will simultaneously redeploy its teaching assistants which will result in the elimination of twenty TA positions. This will decrease the size of the doctoral program, increase the ratio of graduate research assistants to graduate teaching assistants, and improve the 6 year completion rate of doctoral students and their average time to degree. This will improve several metrics used to rate the quality of a graduate program. Reducing the number of teaching assistants will facilitate raising the salaries of TA's to more competitive levels and assist the recruitment of top quality students.

Chemistry is central to the STEM initiative of the State and the University. The department will align initial hiring with many university priorities for which central funds have already been committed and in which the department has a strong research base backed by excellent equipment, facilities and support staff. Thus, the area of materials research which is a prime topic at the national level, hires can be targeted to complement the Advanced Materials TIE (ENCOMM) and the Institute for Materials Research (IMR). The area of energy is also a national research focus and is aligned with the Clean and Sustainable Energy TIE and the Institute for Energy and the Environment. There is also overlap with the Climate, Water and Carbon TIE. In the area of life sciences and chemistry from renewable resources, hires can be leveraged with ties to the medical school and with the Ohio Bioproducts Innovation Center (OBIC). We shall in time, however, need to hire tenure track faculty to maintain the presence of other academic areas to provide a balance of research and teaching expertise. We shall also plan to hire at the senior level whenever possible. Chemistry has a relatively young faculty by MPS standards, thus adding strength at the 35-45 age group will help build future leadership in the department and will be more "cost effective" based on the return of "startup investment". The return in overhead, IDC recovery, will more quickly matches the financial outlay in "startup funds" compared to hiring assistant professors.

The department will also be able to generate the necessary startup funds for new hires as outlined below.

1. The increase in the number of credit hours taught in chemistry can reasonably be expected to continue as the quality of the entering class rises and earned credit hours in organic chemistry continues to increase. At some point, this will reach equilibrium, but the emphasis of STEM has greatly increased our students taking general and organic chemistry; even our majors have doubled in number over the past five years.
2. We are changing the way in which we manage our instruction. This will involve curriculum change and our use of teaching assistants, TAs. We are reducing the number of teaching assistants and increasing the number supported by the faculty as research assistants, RAs. Changes in tuition costs by the graduate school should further facilitate an increase in the number of graduate students as RAs in our department.
3. The introduction of the Chemistry lab fee will provide much needed funds for improving our laboratory infrastructure and equipment. This will greatly assist in the recruitment of faculty to teach these courses.
4. We anticipate that the faculty will be able to increase their research grant income and that the IDC dollars will similarly increase. This is not an unreasonable expectation given our number of assistant professors. The goal is to move from seventh to fourth place among the Big Ten Publics in

the ratio of research expenditures/faculty member in 5 years. Also by creative use of instruction, including the adoption of clinical faculty, we can expect to provide more time for faculty to be involved in large group grant applications such as the MRSEC. The department will also employ professional proposal writers to aid in the preparation of large grant proposals.

Predicting the amount of increased revenue to the college to offset the expense of new tenure track faculty in Chemistry carries with it some uncertainty as would long range predictions of the Ohio weather. However, just as seasonal weather predictions have reliability, we can reasonably estimate a yearly increase in revenue as outlined in the attached table.

FY 09	Credit Hour increase relative to FY06[a]	$ 1,219,725
	Reduction in 20 TAs relative to 20 FY07[b]	$ 591,500
	Laboratory Fee[c]	$ 750,000
	Increase in IDC[d]	$ 400,000
	Total Increase over 2007	$ 2,961,225
FY10	Enrollment increase relative to 2006[e]	$ 2,194,725
	Reduction in 20 TAs relative to 2007[b]	$ 591,500
	Laboratory Fee[c]	$ 1,000,000
	Increase in IDC[f]	$ 600,000
	Total Increase over FY07	$ 4,386,225

[a] Total increase was 6,255 credit hours from 2006 to 2007, and using a conservative estimate of $195 in revenue per credit hour.

[b] Each TA costs the department $5,000 in stipend and $3,450 in tuition for autumn, winter and spring quarters, and 50% of that total for each student's 4th quarter dGRA appointment. Thus each TA costs the Chemistry department a total of $29,575 per year.

[c] Assuming a lab fee of $100 per student for all laboratory courses, and ascribing some of those funds (year 1: $750K; year 2: $500K) for infrastructure improvements in our teaching program.

[d] Using 8 months of existing data and extrapolating for the remaining 4 months.

[e] Assuming a conservative increase in credit hours of 5,000 credit hours for 2007 to 2008 – approximately 4,000 credit hours will occur from the curricula changes for the organic chemistry lecture courses (Chemistry 251-252-253). $195/credit hour was used for the revenue.

[f] An estimate of growth of $200K in year 2, which may be quite conservative.

On the basis of the changes below, we anticipate few changes in the level of effort for faculty instructors in general and organic chemistry. The changes will affect teaching assistants, and will make our assignments consistent with many of our Big Ten peers.

Changes in instructional expenses for large enrollment courses in Chemistry must be balanced against pedagogical and instructional effectiveness, including the use of teaching assistants (TAs) for instruction. In Chemistry, all courses are taught by tenure track faculty or Ph.D. lecturers and auxiliary faculty, while instructional TAs are used in the laboratory and recitation sections. Faculty

and instructors are responsible for the (up to 350 student) lecture components of these courses, while the TAs are involved in mentorship, supplemental instruction and problem solving, and safety issues in the recitation and laboratory sections (typically ~20–30 students per section). A large enrollment general chemistry lecture would have 12–14 recitation and lab sections.

Currently, general chemistry TAs are responsible (per week) for 2 x 1-hour recitation sections, 1 x 3-hour lab section, 2 hours of office hours, grading of quizzes (typically 6 per quarter), and proctoring of examinations (2 midterms and 1 final exam). The average contact hours per week are about 14. Pedagogically, some TAs are better at recitation or office hours because they are innately gifted at *leading* a small group into a deeper understanding of the material. Thus, we will change the general chemistry assignments to consist of either 6–7 one-hour recitations *or* 3 x 3-hour lab sections, based on teaching ability. We will pay these TAs 25% more per quarter during the initial phases of this process. We will alter the grading component by minimizing the number of quizzes or lab reports by two mechanisms: using online tools for quiz and prelab grading (via Carmen) and doing multi-period labs so that there are fewer reports to grade. There will be significantly fewer recitation TAs per lecture (from ≥7 to only 2) so that faculty and instructors can coordinate more consistent instruction between the different recitation sections. Furthermore, multi-period labs will allow pedagogical improvements in inquiry-based labs for synthesis of concepts and scientific material. Office hours will be primarily relegated to paid (hourly) undergraduate student associates (SAs) who will work 10 hours per week in our help rooms. These upper-division SAs have taught labs at OSU and are high-performing undergraduates who can assist in the instruction process. The contact time per TA will remain relatively constant, increased TA stipends will be offset by reduced tuition as a result of using fewer TAs overall, and pedagogical improvements will result by using the best TAs in the right type of instructional setting.

For organic chemistry, current assignments in lecture courses are 4 recitation sections per TA. New assignments will increase to 6 recitations per TA, along with office hours, proctoring, and grading of quizzes and exams. TAs will be paid 25% more during the initial phases of this process, while Chemistry saves on tuition. There will be fewer recitation TAs per lecture (from 3 to 2) so that faculty can coordinate more consistent instruction between the different recitation sections. Organic lab courses have been altered, starting autumn 2008, to offset large waitlists from 2 x 4-hour labs to 2 x 3-hour labs per week. The new TA assignment will change to 4 x 3-hour labs per week, and Chemistry will pay each TA 25% more in stipend, while saving on tuition. We will reduce grading of quizzes and exams by using online testing (Carmen) for quizzes and using some combination of multiple-choice and hand-written exams. Also, we will pay other graduate students and post-doctoral researchers to help grade organic lecture exams on an hourly or per exam basis, thus reducing the burden on the laboratory TAs to grade exams for organic lectures. We anticipate that total contact hours will remain relatively constant with these modified assignments, while using less TAs. Concomitantly, we can be selective in the choice of the best TAs for the appropriate task and provide pedagogical consistency and improvement.

Performance Metrics for the Department of Chemistry

	2007	Comparison Group[a]	2011
Average time to PhD (years)	5.5	5.4	5.0
GTA : GRA ratio	2.9 : 1	1.1 : 1	1 : 1
Time to Candidacy (years)	3	---	2
Entering GRE percentile (Domestic/International):			
Verbal	56/51	64/53	65/65
Quantitative	62/82	69/85	75/85
Chemistry	--/--[b]	49/78	60/80
Total number of graduate students	204	200	260
Graduate students per faculty FTE	5.9	6.4	6.5
PhD success rate (%)	55	62	70
Graduate Student support (%):			
GTAs	62	46	45
GRAs	35	44	45
Fellowships	1	13	10
Number of PhDs per year	28	29	35
% Female PhDs per year	23	30	35
% Minority PhDs per year	8	8	10
Domestic : International graduate student ratio	1.5 : 1	1.7 : 1	3 : 1
Total Research Expenditures	$10.2M	$10.8M	$16.0M
Research Expenditures per Faculty FTE	$297K	$345K	$400K
Total publications per year	115	---	200
Total publications per Faculty FTE	3.3	---	5.0
Number of Patents per year	16	---	20
Total Undergraduate Chemistry majors	248	203	350
Senior Theses	15	---	30
Number of BA and BS degrees per year	43	51	80

[a] Midwest Chairs Survey (2007) with information from peer institutions, including Chicago, Illinois-Chicago, Illinois-Urbana/Champaign, Indiana, Iowa, Iowa State, Michigan, Michigan State, Minnesota, Nebraska, North Carolina, Northwestern, Penn State, Pittsburgh, Purdue, Wayne State, and Wisconsin

[b] Not currently required for graduate admission.

Department of Chemistry Teaching Data as of AY2007-2008†

The industry quarter is teaching 3 quarter courses or 2 semester courses per year for non-star, non-administrative research active faculty.

University	Faculty FTE	Aux Faculty	GTAs ±	Semester Credit Hours
Illinois	38	18	118	45,182
Indiana	31	8	88	21,085
Iowa	25	5	63	22,410
Iowa State	28	3	84	25,539
Michigan	38	4	102	33,641
Michigan St	39	5	125	32,942
Minnesota	39	4	125.8	38,033
Nebraska	23	6	69	17,058
Ohio State	**33**	**8**	**132**	**48,890***
Penn State	33	7	82	29,618
Purdue	52	1	171	46,292
Wisconsin	39	4	139	42,131
Average	34.8	6	108	33,568

†Productive, non-star, non-administrative tenure track faculty

* Converted from quarter hours by multiplying by .666

± individuals, not FTE

Annual Teaching Load

Scholarly Productivity*	Number of Tenured Faculty	Teaching Load
Meets or exceeds expectations	33	3 courses
Does not meet expectations	1	3-6 courses
As defined in the MAPS College Strategic Plan		

Faculty in the department typically teach one course per quarter during the academic year, or three courses per year. With the exception of Ohio Eminent Scholars, the Chair, Vice Chairs and other faculty members that might be assigned an administrative duty, this is the nominal load for all faculty. Assistant Professors have a reduced teaching load in their 1st year of appointment to help in providing extra time for setting up their laboratory, and, again, in their fifth year to assist in preparing for the tenure review in the 6th year. Faculty members with partial appointments in chemistry teach at an equivalent rate to their percentage appointment. Reductions in teaching can be obtained through a number of mechanisms, including FPLs, SRAs, release time funded by grants, and release time assigned for course development. SRAs are awarded competitively after review by the Chair and the Chair's advisory committee with ultimate approval by the Dean, and this procedure will be in effect in the 2009 academic year. Faculty needing dedicated time for research, as in off-campus projects, may also teach multiple sections of a course as a double load, when this meets departmental needs.

Faculty who are unable to attract external funding for their research are normally deemed not to meet expectations. In 2008 academic year 2 faculty members met this criteria. One was an Assistant Professor in the 2nd year of appointment, who was actively seeking federal funding; the other was a senior faculty member. Faculty who lack external funding for one year or more will be given the option of taking on additional teaching duties and having a correspondingly greater portion of their

annual evaluation determined by their performance in teaching. Faculty members lacking an external grant, and having graduate students working for them will take on extra teaching in order to earn money from departmental sources to pay for research supplies and services. The department will encourage faculty members who lose external grants to return to a research productive status when possible, and will adjust the workload of those who cannot contribute to the research mission. In the 2008-2009 academic year there will be no "stuck" associate professors in the chemistry department. In fact there will be no associate professors at all in 2008-2009.

Benchmark Research Staff Support

Big Ten Public	# of faculty	# of grad students	# of technical staff	# of IT staff
Illinois Urbana Champaign	37	340	31	7
Illinois-Chicago	19	120	7	1
Indiana	31	160	21	6
Iowa	25	126	8	2
Michigan	38	200	14	4
Michigan St.	38	198	9	3
Minnesota	38	232	8.4	2
Northwestern	30	240	4	1
Ohio State	34	220	12	7
Penn State	33	224	11	3
Purdue	51	324	26	5
Wisconsin	38	268	19	3
Average	34.33	221	14.2	3.7

School of Earth Sciences

The School of Earth Sciences (SES) was formed in 2006 within the College of Mathematical and Physical Sciences. Its mission is to create and to disseminate scientific knowledge about the Earth. Creation of a School in the academic core of this university was the first step in the enhancement and redevelopment of the degree programs broadly related to Earth sciences. The School facilitates interdisciplinary research in Earth and environmental sciences, and provides a flexible structure that can better adapt to rapidly changing research and educational opportunities.

The formation of SES with the accompanying personnel changes and reorganization of the administration of BPRC forever changed the face of research in the geosciences here at Ohio State. We have made remarkable progress in enhancing the quality, capabilities, and the diversity of the faculty.

Changes to the way the BPRC is administered have assured that research contributions of our Byrd members could be properly attributed to SES. These strategic changes have resulted in a dramatic increase in overall funded research. On a per faculty basis, our 2006-2007 returns on overhead are among the highest of the MPS departments and CIC institutions.

We have been working aggressively to increase our enrollments at both the graduate and undergraduate levels. Student enrollments in the General Education Curriculum (GEC) have been increased by more than 50% from pre-2005 levels to present. These increases have been accomplished through a combination of new courses, aggressive scheduling, and teaching improvements.

Strategic Plan

At Ohio State, the creation of a school with formal divisions is an intermediate step in the formation of a larger unit (school or college) with departments. Thus, our long-term strategy is to grow in faculty size, breadth, and diversity to realize the research challenges and opportunities that are so abundant in the Earth sciences. Our overall strategies focus is on new initiatives in emergent science and societal impact areas, with aims to revise and reinvigorate our undergraduate and graduate instructional curricula. Following are key elements of the strategic plan.

Goal 1. Improve our standing among the peer group of leading Earth science educational and research institutions.
CIC comparisons show that the formation of SES has made us competitive among the best Big 10 universities. Further improvements will require significant improvement in certain areas, particularly those relating to research. The specific budget requests build on two themes – improving what we already have in terms of research and instruction, and expanding with an emphasis on new directions. Over the next decade, our goal is to move to a top 20 institution and be a leading Earth sciences school among peers in the CIC. Our planned faculty staffing is a part of this strategy and will be supported by the following.

We plan to organize research for relevance and competitiveness through (i) the development of broad multidisciplinary research initiatives and (ii) enhancement of infrastructure for research.

Goal 2. Increase student participation through SES degree programs.
SES is planning to increase the numbers and quality of students in its undergraduate programs. The strategies for increasing student participation in graduate programs revolve around diversification of our research efforts into emerging areas, and the revitalization of our existing courses and degree programs. SES is also planning to expand educational opportunities for undergraduate majors in Earth Sciences by adding two new degree programs – a BA in Earth Systems Science (ESS), and a BS in Earth Observing Systems (EOS). Our minimum goal is to increase the number of undergraduate students in our 4-year majors programs to about 125, and M.S. and Ph.D. students to about 100. Key strategies include planned faculty/lecturer staffing increases, targeted programs to engage students, and increases in graduate scholarships and summer research opportunities.

Goal 3. Continue to increase student participation in introductory courses
Our introductory sequences of courses play a critical role in attracting majors and displaying the world of Earth and environmental sciences to other parts of the University. Opportunities exist to continue to expand the breadth of courses at this level, to enhance the undergraduate experience in these courses, and to support the increases in enrollments experienced over the past years, and to reach new

audiences through web-assisted and web-centric programs. Our goal is to increase enrollments in GEC courses by another 20% above present numbers and to reduce dependence on University classroom facilities through construction of a 120-seat classroom.

Key strategies to achieve this goal include revision and reinvigoration our course offerings for non-major undergraduates, the development of new instructional facilities featuring a classroom of the future, faculty professional development in innovative teaching methods and styles.

Goal 4. Increase private giving to the SES
In the present fiscal environment, gifts from private sources will provide an increasingly important resource for developing the SES. Our challenge in increasing donor support is to raise the overall stature of the School with projects and ideas that make sense to donors. Our goal is to increase giving from private donors and foundations ten-fold over current levels.

Key strategies include continuation and intensification of giving campaigns from faculty, alumni, friends of the department, and charitable organizations, and creation of a alumni advisory committee (AAC).

Goal 5. Increase the participation of women and minorities
The SES faculty includes disproportionately small numbers of women and minorities. Our goal is to continue to stress under-represented groups in faculty hiring, and to develop substantial programs that will considerably increase the numbers of under-represented minorities in the undergraduate and graduate programs. s.

Metrics for School of Earth Sciences

1. Numbers of Faculty - total and total of underrepresented groups - Strategic Plan, Goals 1, 5.

2. Numbers of Graduate Students - total and totals of underrepresented groups -Strategic Plan, Goals 2, 5

3. Numbers of B.A, B.S. Majors - total and totals of underrepresented groups - Strategic Plan, Goals 2, 5

4. Numbers of GEC Students in 100, 200-level classes -Strategic Plan, Goal 3

5. Alumni/Industrial Giving (Dollars) - Strategic Plan, Goal 4

6. Research Expenditures (Dollars) - Strategic Plan, Goal 1

7. Overhead Return (Dollars) - Strategic Plan, Goal 1

8. School budget compared to Budget Model estimate - Strategic Plan Goals 1, 2, 3.

School of Earth Sciences MAPS Tenure Track Faculty Standard Teaching Loads †
Data as of AY2007-2008

Note that OSU courses are 5 credit hours (5 lectures/week) whereas semester benchmarks are 3 credit hours (3 lectures/week). Thus SES faculty deliver more lectures (50) in a term than do semester benchmarks (42).

Institution	**Total Faculty/Teaching Professional FTE**	**GTAs**	**Teaching Effort (semester credit hours/year)**	**Typical Teaching Load (semester credit hr/yr)/FTE**	**Avg Course Load per Year**
Illinois – Urbana/Champaign	17.5	16	10373	592.7	3
Iowa	16.25	20.8	8649	532.2	3.5
Penn State	32	27	16170	505.3	3
Michigan State	22.25	6	9303	418.1	3.8
Minnesota	23	18.5	8832	384	2.5
Wisconsin	23	32	8653	376.2	3
Michigan	29	18	10022	345.6	3
Indiana	17	21	5857	344.5	3
Purdue	35.1	25	10210	290.9	3
Northwestern	11.5	5.3	678	59	2.5
Ohio State (*converted to semesters)	**32**	**14**	**22079 (14717)**	**690 (460)**	**2 ****
Average	23.5	18.5	9405	392	2.9

†Productive, non-star, non-administrative tenure track faculty
* quarter credit hours multiplied by 2/3 to obtain semester equivalent.
** converted to semester equivalent

Scholarly Productivity*	**Number of Tenured Faculty**	**Teaching Load**
Distinguished/high productivity (exceeds expectations)	11	7.5 credit hours/year (~1.5 courses/year)
Meets expectations	5	14.6 credit hours/year (~3 courses/year)
Does not meet expectations	7	22.8 credit hours/year (~4.5 courses/year)
* As defined in the MPS College Strategic Plan		

Benchmark Research Support Staff

Big Ten Public	# of faculty	# of grad students	# of tech staff	# of IT staff
Univ. of Illinois	15	34	0	4
Indiana Univ.	17	69	2	1
Univ. of Michigan	27	62	8	3
Michigan State Univ.	23	43	1	0
Univ. of Minnesota	22	45	6	2
Ohio State Univ.	30	83	3	2
Penn State Univ.	31	95	1	2
Purdue Univ.	34	55	2	2
Average	24.875	60.75	2.875	2

Department of Mathematics

The department of mathematics generates ~$5.8m in revenues above its operating expenses. Thus, unlike other units in MPS, the emphasis in the mathematics strategic plan is focused more on improving the quality of the doctoral program and improving the quality of undergraduate instruction and is less concerned with its impact on the finances of the college. Improvements in the efficiency of delivering instruction are still important, of course, and will be identified and implemented. The proposed undergraduate reforms involve redeployment of tenure track faculty, and establishment of a clinical faculty track for the teaching of service courses. This will lead to the recruitment and retention of math majors and STEM students. The department will reduce the number of doctoral students leading to an increased average quality of the doctoral students. This will be offset by the establishment of four new master's degree programs.

Proposals

The Mathematics Department does many things well: it has an excellent Honors program, a rapidly growing Actuarial Science major, a nationally renowned intensive summer mathematics program for gifted high school students, and the Mathematical Biosciences Institute, and is one of only seven national Research Institutes in Mathematics supported by the NSF. This list is not exhaustive! On the other hand, there are many places where the department can improve. Among our aims:

1. Increase the attention and care given to our math majors.
2. Reduce the time-to-degree in our doctoral program from 6.75 years to less than 6 years.
3. Increase the 6-year completion rate of doctoral students from the current value of 40% to 60%.
4. Establish coherent terminal master's programs.
5. Restore the quality and coverage of our research programs, which have been damaged by the substantial decline in the size of our tenure track faculty. The key to the national reputation of the Mathematics Department is the quality of its graduate program and the visibility and breadth of its research mission.

This list is also not exhaustive; but these represent areas that need our urgent attention and commitment of resources.

We propose seven actions below that address the problem areas outlined above. The first four proposals (A, B, C, D) describe ways that the department could reorganize parts of its course offerings to use existing faculty more efficiently. We emphasize that these proposals would not be implemented abruptly, but we plan to implement them over the next 2 years.

A. Upper level service courses (and courses with a large service component) actually lose money for the College (the income generated in tuition/subsidy does not pay the salary of the professors teaching these courses). We propose doubling the section size of some of these courses and staffing them with clinical faculty assuming this rule change will be quickly accepted by university governance.

The aim of this proposal is to make these courses profitable for the College, to provide large numbers of instruction of service courses with clinical faculty members committed to delivering high quality undergraduate instruction and to free up tenure track faculty for teaching in our majors program (see F. below). This will help with point (1) and improve the recruitment and retention rate of mathematics majors.

B. We propose running several "star lecture" sections of calculus 151 and 152. These sections would run with larger lectures — ~240 students, twice the typical size of current lectures in these courses — but with smaller recitations (22 students per recitation instead of the current 28). The lecturers would initially be senior tenure track faculty, and lectures would make full use of media and technological resources: we would ensure that the teachers have sufficient logistical support to guarantee success. Mathematics will need an additional IT staff member to provide this support. Eventually, mathematics 151 and 152 will be taught by clinical faculty members using the new technology to be pioneered by "star" tenure track faculty. This will improve the quality of teaching of non-majors and increase the retention rate of non-mathematics STEM majors.

C. We propose raising the minimum enrollment in graduate topics courses (advanced 800 or 900 level courses with no fixed syllabus) to 8, and distributing the faculty teaching credit thus freed up to faculty supervising post-generals graduate students.

The purpose here is to exercise more control over topics courses and to redistribute resources (faculty time) more effectively within the graduate program, and to better mentor doctoral students. This will improve the 6 year completion rate of doctoral students.

D. We propose standardizing graduate courses at 3 faculty contact hours, following acceptance by university governance. In some courses of five credit hours, a senior graduate student would teach two hours per week as a recitation section. This is the national norm, and in particular all graduate courses at all our benchmark institutions have 3 faculty contact hours.

This would free up 24 regular faculty course loads for math major courses (see F. below), thus improving the quality of instruction of math majors and the retention of undergraduate math majors.

E. We propose *reducing* the size of the *doctoral* program from 130 to 80 students. This will be implemented by applying higher admission criteria. This will result in a higher 6-year completion rate, a larger ratio of RA's to TA's and shorter, average graduation times. As the size of the doctoral program is decreased the department will increase the size of the master's program to 50 students. We note that the current size of the graduate program is also 130 students, so this involves no net change in the total number of graduate students. The new distribution will allow us to improve the quality of our doctoral program, with the simultaneous development of new, terminal Master's degrees. This will address points (2), (3), and (4). The terminal master's program will be in the areas of Financial Mathematics, Applied Mathematics, Mathematical Biology (which is aligned with a TIE) and Math Education. The Colleges of Business, Engineering, Biological Sciences and Education will be approached, seeking their collaboration in the development and execution of the specialty-specific courses in the program. Implementation will be gradual, with a goal of submitting one program per year to university governance, beginning in the 2008-2009 academic year.

F. We propose to staff all math major courses with regular faculty, and to designate certain lectures of 151–2–3 "math major lectures," intended for prospective math majors, and staffed with tenure track faculty. The broader goal is to increase the care and attention paid to our math majors, with regular faculty more involved in the advising of our undergraduate majors (the actuarial science students and honors students are already well looked after, but the remaining 60% are less carefully monitored by tenure track faculty). In this way we hope to increase the size of our major programs. Our target is 100 math and actuarial science majors per year (the current number is about 70 per year, about 1/3 of those actuarial science.) We hope that with more options and more faculty involvement will attract more students and improve retention.

This will address point (1).

G. We are losing ground in those research programs that gave the math department its national standing and its ability to attract high quality graduate students. The Mathematics Department was rated 29th in the last NRC ranking, and there is a real chance that this ranking will decline further as a

result of key faculty departures. The breadth of coverage, an important part of a mathematics department at a public university, has also been damaged. The programs recognized by US News & World Report are threatened—especially Combinatorics. This hurts a central part of the mission of the Department, the production of mathematically trained citizens at the undergraduate, master's, and doctoral levels. Attracting the best students requires an excellent and visible faculty. The Department will utilize the Alice Woods Professorship and the Saltzer Chair to recruit prominent mathematicians in the next two years.

The department needs to hire in the following areas; the first four are currently attracting the most graduate students in our department (and the best applicants to our program).

Combinatorics: a key member is retiring, bringing the group down to 2 faculty; our Discrete Mathematics and Combinatorics program was listed as #7 in the country (tied with Georgia Tech) in 2007 by US News & World Report.

Mathematical Biology: the presence in the university of the national Mathematical Biosciences Institute presents the Department with a unique opportunity to strengthen its program in applied mathematics in general and biomathematics in particular.

Algebraic Geometry and Number Theory: Number Theory has been a traditional strength at Ohio State, and the number theory group used to be extremely strong: it was rated #5 in 1996 by US News & World Report. However, the group has shrunk considerably, with departures and retirements, and again a key retirement is occurring this year. Our Algebra/Algebraic Geometry/Number Theory program was rated #13 (tied with Brown) in 2007.

Global Analysis:. We have a Selective Investment position in Global analysis. Differential Equations, Ergodic Theory, and Dynamical Systems are currently attracting the most students.

Financial Mathematics: We have a flourishing undergraduate Actuarial Science program and we need additional faculty to help with that program and to develop a targeted Master's degree in Actuarial Science/Financial Mathematics.

The new faculty to be recruited will address point (5).

Department of Mathematics MAPS Tenure Track Faculty Standard Teaching Loads †
Data as of AY2007-2008

	Tenure-track Faculty	**Teaching Postdocs**	**Other Lecturers**	**GTAs ±**	**Math course enrollments Autumn term**	**Semester Courses per Year**
Michigan St	58	9	20	113	10, 892	4
Ohio St	**62**	**21**	**0**	**126**	**11, 358**	**3.33(5)**
Penn St	54	5	27	84	10, 669	4
Arizona	62	10	40	46	8, 012	4
UCLA	57	16	23	161	5, 607	3
Illinois	70	12	6	252	11, 817	3
Michigan	64	45	7	133	7, 211	3
Minnesota	74	11	9	116	7, 208	3
North Carolina	33	9	3	56	2, 514	4
Texas	52	19	10	153	10, 937	3.5
Washington	50	4	6	87	5, 757	4
Wisconsin	53	12	5	182	7, 638	3
Average	57	14	13	126	8,302	3.5

± individuals, not FTE

†Productive, non-star, non-administrative tenure track faculty

Scholarly Productivity*	Number of Tenured Faculty	Teaching Load*
Distinguished/high productivity (exceeds expectations)	5	2 quarter courses/year
Meets expectations	39	4-5 quarter courses/year
Does not meet expectations	6	6 quarter courses/year
* As defined in the MPS College Strategic Plan		

Benchmark Research Support Staff

Big Ten Public	# of faculty	# of grad students	# of tech staff	# of IT staff
OSU	63	136	N/A	5
Minnesota	68	190	N/A	2
Wisconsin	52	156	N/A	3
Northwestern	28	41	N/A	1
Michigan State	61	112	N/A	2
Michigan			N/A	
Illinois			N/A	
Indiana	45	127	N/A	1.5
Purdue			N/A	
Penn State			N/A	
Iowa			N/A	
Average	52.8	127		2.41

Department of Physics

The Physics Department employs Graduate Teaching Assistants (GTA) to support instruction through assignment as a recitation and/or lab instructor in its large service courses or as a grader for courses ranging from its introductory Honors sequence to advanced graduate seminars. The latter need is approximately 10 GTA per quarter. The reorganization underway pertains only to the use of GTA in the large service courses, in which each student is provided instruction via lectures, recitations, and laboratories.

In large service courses a full lecture section (meeting 2-3 times per week) is provided by a faculty member and serves 215 students; in the old scheme the recitation section (meeting 2 times per week) was provided by a "recitation GTA" and served about 36 students; and the lab section (meeting once per week for a 2 hour block) was provided by a "lab GTA" and served about 22 students. The assignment structure required a total of five GTAs to support one full lecture section and provided little opportunity or encouragement to interconnect these components of a given course.

In the new scheme, the lecture section is unchanged. But now the same cadre of about 27 students is registered into each pair of coupled recitation and lab sections and that the *same* GTA instruct both the formal recitation and lab sections. Physics is redesigning the labs to better focus the student's activity on challenging concepts and to integrate with other group learning activities. Additionally we have switched from the old mode of uncollected/ungraded homework to a web-based system that assigns a customized problem set weekly to each student and records for credit the number they complete successfully. The students appreciate the immediate feedback, and less time is needed in recitation to provide answers to homework problems. Our new assignment structure is being phased in over the 2007-08 academic year. It requires a total of four GTAs to support one full lecture section and hence provides a potential reduction relative to the historical structure of 20%* in GTAs needed for the service course instruction while improving that instruction by having better integration of the various components of the course.

Spring quarter 2008 is the first quarter in which all the large regular introductory courses implemented the new assignment mode. Hence a comparison of spring 2007 to 2008 provides a concrete example of the improved efficiency. Since STEM enrollments are growing, the meaningful comparison is between what would have been needed to service that growing enrollment (the 70.5 GTA approximate projection based on scaling the spring 2007 need) and that actually needed in spring 2008 (the 53 GTA actually needed). *The Department is providing improved instruction to ~15% more students with ~14% fewer Rec/Lab GTA.*

Quarter	111-2-3 + 131-2-3 enrollment	Old mode need for Recitation and Lab GTA	New mode need for Recitation/Lab GTA
Spring 2007	2207	61.5	------
Spring 2008	2531	~70.5**	53

*Actual efficiencies for Spring 2008, at 29%, are greater than 20%.
**projected need scaling the Spring 2007 need to the Spring 2008 enrollment
Note: The needs in this table do NOT include the relatively inelastic need for about 10 GTA per quarter as graders, and it should be stressed that these 'GTA needs' are actually met by a combination of appointments as GTA, temporary lecturers, and a few undergrad TA.

The next step involves significant renovation of lab spaces in Smith Lab to create ~2000 asf PALET (Physics Activity Lab Enhanced with Technology) classrooms designed to support our integrated recitation/lab activities in a large capacity format (about 70-80 students). This format permits scheduling within a 24-hour period any specific course activity for ALL students in a course, enabling these activities to be better in sync (and potentially of more value) with the lectures. The student to instructor ratio in recitation/lab will not change through use of a team of three instructors per PALET section. However, this team approach opens the possibility of sometimes using a qualified undergrad as one member of the team. Depending on the availability and use of these undergrad instructional assistants, the number of GTAs needed to support one full lecture could be as low as three, or an additional 20% reduction from our historical scheme. Hence as the three PALET classrooms become available over the next few years, we would be able to further reduce our GTA need to our target of around 50 associated with these recitation/lab duties or a total of about 60 GTA including those with grading assignments.

GTA actual numbers and projections:

WE STRESS that the GTA need is addressed in three ways: hiring GTA, hiring temporary lecturers, and hiring a few undergraduate teaching assistants.

Note that physics is saving 17.5 GTAs in spring 2008 when comparing needs for the old and new modes for the spring 2008 enrollment. This is a (17.5/70.5)*100%=25% savings.

The total need for GTA (rec + lab + grader) in Au06 and Wi07 was 76 compared with total need in Sp07 of 61.5 rec/lab + 10.5 grader = 72 total GTA need. Hence due to this quarterly enrollment imbalance, we estimate about 3-4 more GTA needed in Au08 and Wi09 than we need now in Sp08 (when 53 rec/lab + 11.5 grader = 64.5 total GTA need). Hence the projected total need for GTA would be about 68 for Au08 and Wi09, and about 65 in Sp09. Su08 is projected to be down from 15 in Su07 to about 13, although the smaller class sizes in summer makes potential efficiencies harder to predict.

Please note the ACTUAL number of GTA employed in Sp08 is likely to be only 53.5 (compared with total need = 64.5) compared with actual 63.5 employed in Sp07 (compared with total need = 72). Our target is to get the need and supply of GTA to both be about 60. The very small incoming grad classes in the last few years have driven the actual number of GTA appointments below this level and we are filling the difference between this actual number of GTA and the GTA 'need' by hiring temporary lecturers. Hence, the 'savings' will occur more in reduced hiring of temporary lecturers than in further reduction in GTA appointments, which are already below the target value.

Proposed Physics Department Performance Metrics

Here we assemble metrics for assessing Physics Department Performance for the period 2007-2012. Most of the metrics appear in tabular form (see Table 1 below), with the numerical metrics for the baseline year or years, the current benchmark (or national) university averages for the metrics, and our goal metrics for 2012 given in separate columns.

We believe the goal metrics for 2012 are within reach. The quality of our graduate students, particularly the domestic ones, has been increasing rapidly in the past 6-8 years, and we expect this trend to continue. The number of GRA's in our program has increased by at least a third in the past

five years, and we expect this trend to continue. Reworking of our service courses is bringing the number of GTAs down. OSURF expenditures are going up, and this will continue with the increasing success of our recent hires. We give expenditure data for FY06 as that is the last year for which the comparison data are currently available. In FY07 our total expenditures rose to $11.4M from $9.9M in FY06, so that we are already one third of the way to our goal for FY12. We expect our 10-year publication count to rise substantially, driven by new hires and the new output expected from our strong programs at the LHC. We are aggressively attempting to increase the number of women graduate students. And, we are implementing curricular changes following on GTA/GRA policy changes that are expected to reduce the time to Ph. D. for our graduate students.

Following Table 1 are related plots and data. A plot of time to Ph. D. for our graduates in the period 2001-2007 is given, as are plots of FY06 external funding and 10-year publication counts, total and per faculty member, as a function of US News 2006 ranking for the Ohio State comparison group of university physics departments. Note that our department appears at rank 24 in the plots. A table of relevant data for the comparison group is also provided. Other metrics are derivable from this table, but we have chosen those both correlated with ranking and which appear possible to affect in the relatively short 2007-2012 period.

A metric not nicely amenable to inclusion in Table 1 is that of major awards to faculty. Such awards in the previous 5 years will also be one of our performance metrics. In the five year period 2003 through 2007 our major awards were the 2007 APS McGroddy Prize to Art Epstein, the 2007 Optical Society of America Meggers Award to Pierre Agostini, the 2006 Gaede-Langmuir Award of the AVS to Len Brillson, and the 2006 Sackler Prize from Tel Aviv University to Yuri Kovchegov. At the end of 2012 our goal is that our faculty will have increased the 2003-2007 total of four awards to a total of six for 2008-2012. We have one already for this latter period, the 2008 Onsager Prize to Tin-Lun (Jason) Ho, and we are implementing an aggressive award nomination strategy aimed at improving our record. We do not have access to awards information for the benchmark universities.

It is very important to note that our target metrics for 2012 assume a faculty size of 58, our count in Fall 2007. These target metrics should be scaled back proportionately with any faculty shrinkage in the 2007-2012 period.

Table 1. Proposed performance metrics for the Department of Physics

	Autumn 2007	Comparison group ave. *	Autumn 2012
Average time to Ph.D. for the six year period 2001-2007	6.3	6.5**	6.0
Completion % of grad students to Ph.D.	70	50 **	70
Number of Ph.D./year ***	17	21	20
% women Ph.D.'s/year ***	12	14 **	14
Ave. Physics GRE % of enrolled graduate student class	65	73	70
Ave. general GRE %			

of enrolled graduate student class			
verbal	69	80	80
quantitative	87	90	90
Total # of graduate students	157	166	160
Total # of graduate students/faculty	2.7	3.1	2.8
Numbers of GRAs , GTAs, and Fellows			
GRAs	82	84	90
GTAs	64	74	60
Fellows	10	8	10
Total departmental OSURF expenditures per year ($M, FY06)	9.9	14.0	14.0
FY06 OSURF expenditures per faculty member ($K)	171	262	215
Total departmental publications over the most recent 10 years (1998-2007)	1782	2117	2000
Publications per faculty member over the most recent 10 years (1998-2007)	30.7	39.9	35

° OSU Benchmark schools are U. Arizona, UCLA, U. Illinois, U. Michigan, U. Minnesota, U. Texas, U. Washington, and U. Wisconsin. Benchmark group student numbers include domestic+foreign students.

** National average for Physics Ph.D. programs from AIP

*** Calculated from Ph.D.'s awarded from autumn 2004 to summer 2007

Department of Physics Tenure Track Faculty Standard Teaching Loads †
Data as of AY2007-2008

Institution	Terms/ Yr.	Courses/ Term	Faculty	GTAs ±	Lecturers	Credit Hours	Credit Hours/ (Fac*Term)	Credit Hours/ (FTE*Term)
Illinois	2	1	61	130		38866	318.6	154.2
Michigan	2	1	59	77	8	25264	214.1	119.7
Maryland	2	1	71	57		24402	171.8	122.6
Wisconsin	2	1	40	92		23116	289.0	134.4
Minnesota	2	1	39	75	2	25343	324.9	161.4
Ohio State (converted to semester)	**2**	**1**	**54**	**58**	**10**	**55223 (36778)**	**340.9**	**197.9**
Purdue	2	1	52.25	76.5	2	36044	344.9	194.8
Indiana	2	1	36	24		13514	187.7	140.8
Iowa State	2	1	40	42	3.75	21065	263.3	162.7
Iowa	2	1.5	30	26		13076	152.0	152.0
Average	2	1.05	48.2	65.7	5.1	25747	260.7	154

†Productive, non-star, non-administrative tenure track faculty

± individuals, not FTE

* in a 3 hour course there are 3 lectures/week or 3 contact hours/week. This corresponds to 30 contact hours a quarter or 45 contact hours a semester.

Scholarly Productivity*	Number of Faculty	Teaching (courses/year)
Meets or exceeds expectations	45	3
Does not meet expectations	5	3-6
* As defined in the MPS College Strategic Plan		

Faculty in the physics department typically teach one course per quarter during the academic year, or three courses per year. This is the national norm in the field. With a single exception this is the nominal load for all faculty. Reductions in teaching can be obtained through a number of mechanisms, including FPLs, SRAs, release time funded by grants, and release time assigned for administration or course development. SRAs are awarded competitively after review by a faculty committee, and this procedure will be extended to FPLs in 2008/2009. Faculty needing dedicated time for research (e.g. off-campus projects) may also teach multiple sections of a course as a double load when this meets departmental needs.

Faculty who are unable to attract external funding for their research are normally deemed to not meet expectations. These faculty are given the option of taking on additional teaching duties and having a correspondingly greater portion of their annual evaluation determined by their performance in teaching. Of the four faculty who were offered this option last year, two accepted a doubled teaching load and are performing well with this revised workload. Of the two who declined, one subsequently had two major grant proposals funded, and is back on track to becoming a research-productive member of the department. The department will be examining its policy with an eye toward returning faculty to research productive status when possible, and adjusting the workload of those who cannot contribute to the research mission.

Benchmark Research Support Staff

Big Ten Public	# of faculty	# of grad students	# of tech staff	# of IT staff
The Ohio State University	56.5	161	15	5.7
University of Illinois	62	295	20	4
University of Michigan	55	138	16.8	6
University of Wisconsin	53	162	11	8.5
Penn State	43	119	10	4
University of Minnesota	39	118	15	6
Michigan State University	61	152	9.5	3
Purdue University	51	141	13	6
Indiana University	36	90	18	2
University of Iowa	30	66	7	3
Average	48.65	144.2	13.53	4.82

Department of Statistics

Statistics is an expansive discipline that encompasses areas ranging from data acquisition and analysis to the science of decision making under uncertainty. The mission of our Department of Statistics at Ohio State is to achieve and maintain excellence in research, teaching, and service as motivated by innovative solutions to real world problems. The large student body and diversity of excellent programs across the university requires a sizable faculty covering the broad expanse of statistical research activities.

The Department's research effort has increased dramatically over the past decade, with tangible recognition of that effort provided through professional honors (every full professor in the Department is a Fellow of the American Statistical Association, where Fellowship is limited by Association rules to no more than 1/3 of 1% of its membership) and external funding support for our research—see Tables 2-4 documenting the dramatic external funding increase for our faculty over the past eight years.

Research directions and funding patterns in Statistics are responsive to growth in computing power, software, and observational methods, most often aligned with areas of interest in the biological, social and physical sciences and engineering. Our faculty excels at both methodological work and statistical applications. We are heavily involved in collaborative research that has consistently attracted funding from a broad range of federal agencies, including NIH, NSF, NASA, NSA, ONR, EPA, the US Department of Transportation, the Bureau of Justice Statistics, and The American Chemistry Council.

Research collaboration with biological and medical scientists plays a major role in the Department. Indeed, the NSF Mathematical Biosciences Institute (MBI) was brought to Ohio State through the joint efforts of the Departments of Statistics and Mathematics. In addition, statistics faculty members conduct joint research with scientists in the Comprehensive Cancer Center, the Clinical Research Center, and the Biostatistics Center, as well as with other colleagues in the Colleges of Dentistry, Medicine, Nursing, Pharmacy, and Veterinary Medicine.

The Department also has significant involvement in the environmental sciences. Members of our faculty regularly collaborate with researchers from a variety of environmentally oriented Ohio State departments and The Byrd Polar Center, as well as externally with IPCC, JPL, and The National Center for Atmospheric Research. Our Department houses the Program in Spatial Statistics and Environmental Sciences (EESE), a world leader in the area. Other important research collaborations exist with university colleagues in Anthropology, Psychology, Sociology, Geography, EEOB, the Fisher College of Business, and Civil and Electrical Engineering, as well as with Battelle Memorial Institute and Children's Hospital.

The Department of Statistics is also the national leader in Statistics Education. It drives the national statistics education reform movement, especially through the Consortium for the Advancement of Undergraduate Statistics Education (CAUSE), the United States Conference on Teaching Statistics (the only national conference dedicated to teaching undergraduate statistics) that was hosted by Ohio State in 2005 and 2007, and the Electronic Encyclopedia of Statistical Examples and Exercises (EESEE). All of these activities have been supported with NSF funding.

Graduate Program

We have been steadily increasing the quality and quantity of our graduate student body over the past six years. The table below shows the numbers of graduates from each of our programs for the past eight academic years.

Statistics and Biostatistics Graduates 2000-01 to 2006-07

Academic Year	00-01	01-02	02-03	03-04	04-05	05-06	06-07
PhD	5	1	6	6	6	13	14
MS	10	12	22	19	22	21	13
MAS	14	23	14	28	28	30	33

The increase in the number of MS degrees awarded beginning in 2002-2003 is mainly a result of the increased enrollment in our Ph.D. programs. Students generally receive the MS en route to the Ph.D. The direct effect of this increase in Ph.D. enrollment is evident beginning in 2005-2006 when the students who entered our program in 2001-2002 graduated. The doubling in the number of our MAS graduates over this period is the result of our External Masters program. These students enroll in at least 50 credit hours of our courses, with no funding from Statistics, while working on a graduate degree in another department. We believe that having these excellent students in (mainly) the applied classes with our own graduate students increases the value of the class for all students. The external students often bring subject-matter concerns to the discussions, which helps traditional statistics students see the type of discipline specific questions that need to be addressed along with the theoretical questions. Another impact from this External Masters Program is the improvement in quality of the dissertation research for these students as a result of their mastery of more advanced statistical techniques. Our rejuvenated Statistical Consulting Service provides additional support for improved graduate student research across campus.

Not only do we attract high quality graduate applicants (we do very well every year in the University wide Fellowship competition conducted by the Graduate School, both in terms of awards and acceptances), but also those who choose to enroll in our graduate program are excellent students and compete very well with the top statistics graduate students across the country. We actively encourage our students to get involved in research early and then to travel to conferences to present their research. This initiative has been an unqualified success — in the past five years we have had a total of 102 students give such research presentations just at our annual Joint Statistics Meetings alone. This places us among the top two or three Statistics programs across the country in this regard. We also encourage our students to apply for national, international, and local awards for their research and travel and they have been highly successful in these competitions. Since we started keeping records in 2001, 16 of our graduate students have won national or international student-paper competitions: 14 through the American Statistical Association and 2 in other competitions. Eighteen have successfully competed at the national/international level for travel support to national and international conferences; three of those were winners of the very competitive Laha Travel Award from the Institute of Mathematical Statistics. In 2007 one of our female graduate students won the prestigious Gertrude M. Cox Scholarship from the American Statistical Association and the Caucus for Women in Statistics. Finally, one of our students was the "Stat Bowl Champion" at both the 2004 and 2005 Joint Statistical Meetings, the only two-time winner since the competition began.

Going Forward

The Department of Statistics will hire a replacement for Professor Tailen Hsing, who left the Department last year. Academic Enrichment funding was initially used to hire Hsing with the expressed goal of providing leadership for the Department's interdisciplinary research with faculty in the Colleges of Biological Sciences (COB) and Medicine (COM). This effort is even more critical now as a result of the substantial funding that is currently received from the National Science Foundation in support of the Mathematical Biosciences Institute (MBI). Over the past few years, Professors Shili Lin and Joe Verducci in Statistics have assumed leadership roles in this important arena and provide vital links with the MBI. As a result, we believe it is best if the replacement hire for

Hsing be an entry level Assistant Professor to work with Lin and Verducci to continue expansion in this area. The cost for an entry level Assistant Professor in the Department of Statistics is:

Annual Rate Salary Plus Benefits: $96,946
One-time Start Up Costs: $106,000—cash of $36,000 for each of three years

As has been the case with all of the recent faculty appointments in Statistics, we anticipate this replacement hire to fully pay for itself within three years. This will happen for two reasons. First, the new faculty member will play an important role in the expanded MBI activities as part of the TIE initiative. Our first MBI/TIE hire (joint with the Department of Evolution, Ecology, and Organismal Biology (EEOB) in COB), Laura Kubatko, has already established an active collaborative research program with faculty members in EEOB. It is clear from Laura's initial effort that there is considerable demand for expanding this collaboration on projects relevant to the overall MBI/TIE program and that this expansion will attract additional external funding and IDC cost returns.

The second source that will be used to cover the cost of this replacement hire comes from the increased SCRs expected from growing the recently approved Graduate Minors in Statistics and Statistical Data Analysis and the newly revised Undergraduate Minor in Statistics. The two Graduate Minors (approved a little over a year ago) have already led to expanded enrollments in our graduate service courses. They are attractive options for students in other programs who need additional statistics expertise for their doctoral studies but who do not wish to fully commit to our External Master of Applied Statistics (MAS) degree program. The revised Undergraduate Minor in Statistics was just approved this year but it is already attracting top undergraduate students from the Honors Program. We plan to market this Undergraduate Minor in combination with our MAS degree (requiring one additional year here at Ohio State) as an excellent option for top undergraduates prior to their application for Ph.D. studies in their chosen disciplines. The Department of Statistics has had great success in attracting non-Statistics students at Ohio State to our external MAS degree program while they concurrently pursue doctorates in their research disciplines, with the driving motivation being improved dissertation research and enhanced employment opportunities after completion of their Ph.D.'s. We fully expect similar success with the very best undergraduate students but for a different reason, namely that the enhanced Statistics Minor/MAS combination will give them an important edge for acceptance into the very best Ph.D. programs in their chosen disciplines. The new MBI/TIE hire will not necessarily teach the additional students in our Graduate Minors and Undergraduate Minor/MAS courses. The hire will, however, teach courses related to his/her interests, which will enable other faculty members in the Department to teach the expanded service courses.

As noted elsewhere in this document, there are two other issues of vital importance to the Department of Statistics. The first is the need to provide sufficient computational infrastructure to support the teaching and research arms of our Department. This includes maintaining current hardware and software for our faculty, staff, and graduate students and enough computer support staff to adequately maintain it. The second involves improvement of our "home" environment in Cockins Hall. The dingy and deteriorating condition of the building has become a serious liability for recruiting (and retaining) the very best faculty and graduate students. It is imperative that the University takes the appropriate steps to renovate Cockins Hall and bring it at least to the turn of the 21st Century.

Evaluation Criteria

The Department of Statistics will evaluate its progress using (a) Internal Benchmark Criteria that are designed to assess its performance over time and (b) External Benchmark Criteria that will be used to assess our relative standing over time against our ten benchmark institutions. The Department will select the five public institutions immediately above and the five public institutions immediately

below Ohio State in the upcoming NRC rankings to be our benchmark institutions. Once this information is available the department will begin to collect the needed external benchmark criteria data from these ten institutions and compare it to our own data.

Internal Benchmark Criteria--all tracked over time (starting with a reasonable base year):

1. Total annual department expenditures on externally funded projects; total annual university-wide expenditures for externally funded projects on which a faculty member is PI or co-PI; department IDC cost recovery from external funding
2. SEI comparisons of faculty teaching with respect to both College and University averages in similar level and size courses, along with whether a course is required or not (as stipulated in the SEI reports)
3. Number of fellowships awarded in the University Fellowship competition; Percentage of awarded fellowships that are accepted; Number of women awarded fellowships in the University Fellowship competition; Percentage of women who accept fellowships; Number of fellowships awarded in the Graduate Enrichment Fellowship competition; percentage of Graduate Enrichment fellowships that are accepted; percentage of enrolled Graduate Enrichment Fellows who earn graduate degrees
4. Number of presentations/posters by our Ph.D. students at national and international meetings.

External Benchmark Criteria--all compared over time with our ten benchmark institutions

1. Student placement with differential criteria for academic and industrial/governmental positions; also differentiate between MAS/MS and PhD graduates; for PhD graduates, place emphasis on the percentage of non-postdoc initial positions
2. GRE scores (verbal, quantitative, and analytical), separately for domestic and international students and separately for Ph.D. and MAS/MS students
3. Professional awards received by graduate students and faculty
4. Percentage of full professors who are Fellows in professional societies (ASA, IMS, and AAAS)

5. Percentage of full professors who are Associate Editors or Editors of journals--three-year rolling average of both the number of faculty involved and the number of journals served
6. Percentage of tenured faculty who are involved as PhD advisors--rolling three-year window for counts
7. Average per faculty number of publications--three-year rolling average; Total number of publications in the top four statistics journals: *Annals of Statistics*, *JASA, Biometrika,* and J*RSSB*--three-year rolling average
8. Number of Tenure Track Faculty: FTE's
9. Percentage women among the tenure-track faculty and among the graduate students

As shown in Tables 1-4 the Department of Statistics has enjoyed admirable growth in student credit hours taught, research dollars expended, IDC's generated, and collaborative grants with other units that have been awarded. Previous expansion of the size of the tenure track faculty in statistics has "paid for itself" by increased revenue from graduate SCRs and IDCs and efficient usage of auxiliary/clinical faculty in teaching required undergraduate courses.

DEPARTMENT OF STATISTICS
FINANCIAL BENCHMARKS & NOTES
STRATEGIC BUDGET PLANNING FY 09

1. The Department through clear planning and targeted teaching efforts has dramatically increased it's offering of service courses to graduate students across the university. Approximately half, 4000 credit hours, of our graduate credit hours are offered to graduates who are not our employees.

	Undergraduate Credit Hours	Annual Undergraduate Increase	Graduate Credit Hours	Annual Graduate Increase	Total
Fiscal Year 2000	27,787		4,006		31,793
Fiscal Year 2001	27,747	-40	4,999	993	32,746
Fiscal Year 2002	26,357	-1,390	5,873	874	32,230
Fiscal Year 2003	27,051	694	6,771	898	33,822
Fiscal Year 2004	27,638	587	7,265	494	34,903
Fiscal Year 2005	26,964	-674	8,003	738	34,967
Fiscal Year 2006	26,919	-45	7,891	-112	34,810
Fiscal Year 2007	28,747	1,828	8,617	726	37,364
Estimated Fiscal Year 2008	27,226	-1,521	9,110	493	36,336
Total Student Credit Hour Increase Since FY 00		-561		5,104	4,543
Total Percentage Increase		-2.02%		127.41%	14.29%

2. Over the past 10 years the Department made key targeted academic enrichment hires and along with additional concerted effort by the faculty has generated a phenomenal increase in OSURF grants and indirect cost returns.

	Sponsor Direct Expenditures	Annual Expenditure Increase	Sponsor F&A	Annual F&A Increase	Total Costs
Fiscal Year 1999	$248,376		$82,683		$331,059
Fiscal Year 2000	$457,068	$208,692	$136,420	$53,737	$593,488
Fiscal Year 2001	$435,689	-$21,379	$159,477	$23,058	$595,167
Fiscal Year 2002	$433,672	-$2,018	$173,806	$14,328	$607,477
Fiscal Year 2003	$886,750	$453,078	$308,208	$134,402	$1,194,958
Fiscal Year 2004	$1,108,824	$222,074	$385,596	$77,388	$1,494,420
Fiscal Year 2005	$1,467,966	$359,142	$526,326	$140,730	$1,994,292
Fiscal Year 2006	$1,737,526	$269,560	$579,027	$52,701	$2,316,553
Fiscal Year 2007	$1,954,839	$217,313	$655,740	$76,713	$2,610,579
Estimated Fiscal Year 2008	$1,517,894	-$436,946	$581,598	-$74,142	$2,099,492
Total Increase Since FY 99		$1,269,517		$498,915	$1,768,432
Total Percentage Increase		511.13%		603.41%	534.17%

3. Over the past 10 years the Department made key targeted academic enrichment hires and along with additional concerted effort by the faculty has generated a phenomenal increase in OSURF grants and indirect cost returns. **Excluding MBI Expenses & IDCR in this calculation

	Sponsor Direct Expenditures	Annual Expenditure Increase	Sponsor F&A	Annual F&A Increase	Total Costs
Fiscal Year 1999	$248,376		$82,683		$331,059
Fiscal Year 2000	$457,068	$208,692	$136,420	$53,737	$593,488
Fiscal Year 2001	$435,689	-$21,379	$159,477	$23,058	$595,167
Fiscal Year 2002	$433,672	-$2,018	$173,806	$14,328	$607,477
Fiscal Year 2003	$511,297	$77,625	$186,598	$12,792	$697,895
Fiscal Year 2004	$435,428	-$75,869	$191,493	$4,895	$626,920
Fiscal Year 2005	$765,096	$329,668	$317,545	$126,053	$1,082,641
Fiscal Year 2006	$1,031,684	$266,589	$391,385	$73,840	$1,423,070
Fiscal Year 2007	$1,275,491	$243,806	$462,609	$71,224	$1,738,099
Estimated Fiscal Year 2008	$1,461,790	$186,299	$578,356	$115,747	$2,040,146
Total Increase Since FY 99		$1,213,414		$495,673	$1,709,087
Total Percentage Increase		488.54%		599.49%	516.25%

Table 4. Over the past ten years the Department of Statistics has been very successful at increasing the number of PI's and CoPI's on collaborative grants and increasing the total expenditures from grants on which it participates.

	Total Collaborative Grant Expenditures	Annual Expenditure Increase
Fiscal Year 1999	$398,562	
Fiscal Year 2000	$651,774	$253,213
Fiscal Year 2001	$771,661	$119,887
Fiscal Year 2002	$988,110	$216,449
Fiscal Year 2003	$1,862,566	$874,457
Fiscal Year 2004	$2,804,076	$941,510
Fiscal Year 2005	$3,886,021	$1,081,945
Fiscal Year 2006	$4,363,382	$477,361
Fiscal Year 2007	$5,982,351	$1,618,969
Estimated Fiscal Year 2008	$5,542,839	-$439,512
Total Increase Since FY 99		$5,144,277
Total Percentage Increase		1290.71%

MAPS Tenure Track Faculty Standard Teaching Loads †
Data as of AY2007-2008

Department of Statistics

Department of Statistics--Institution	Tenure Track Faculty	GTA Count	Undergrad Credit Hours	Graduate Credit Hours	Non-Tenure-Track Faculty	Typical Teaching Load
UC Berkeley	18	25	14,000	2,000	7	3 courses
UCLA		NO	RESPONSE			
Carnegie Mellon	13	39	4,617	2,179	15	2 courses
Colorado State		NO	RESPONSE			
Duke	11	28	N/A	N/A	5	3 courses
Florida	15	34	18,448	2,649	5	3 courses
Florida State	12	37	N/A	N/A	2	3 courses
Illinois		NO	RESPONSE			
Iowa	17	32	10,010	2,374	4	3 courses
Iowa State	32	34	15,245	1,827	1.5	4 courses
Michigan	17	50	19,622	2,716	15	3 courses
Michigan State	20	24	15,593	1,149	7.5	3 courses
Minnesota		NO	RESPONSE			
NC State	29	57	10,450	5,940	4	3 courses
Ohio State (converted to semesters)	**25**	**50.5**	**25,909 (17,273)**	**6,761 (4,507)**	**3.5**	**4.5 courses (3 courses)**
Penn State	22	44	19,785	2,464	6	3 courses
Purdue	34	29	N/A	N/A	10	4 courses
Rutgers		NO	RESPONSE			
Texas A & M		NO	RESPONSE			
Washington		NO	RESPONSE			
Wisconsin	20	30	N/A	N/A	7	3.5 courses
Average	20.36	36.68	14,504	2,780	6.6	3.1 courses

†Productive, non-star, non-administrative tenure track faculty
N/A = Not Available

All of the schools that responded (except Ohio State) are on the semester system and each of them defines a course to be a three credit hour course. Our typical teaching load of 13.5 classroom contact credit hours per year is equivalent to 4.5 three credit hour quarter courses per academic year. That is equivalent to 3 three credit hour semester courses per academic year. The undergraduate and graduate quarter credit hour counts at Ohio State were multiplied by 2/3 to be comparable with semester credit hour counts.

Scholarly Productivity	Number of Tenured Faculty	Teaching Load
Distinguished/high productivity (exceeds expectations)	6	4 *1 , 4.5 , 8 *2 , 10 , 10*3, 10.5 Credit hours for the 2008-2009 academic year
Meets expectations	8	0*4, 3*5, 4*6, 7*7, 9, 9*8, 12, 13 credit hours for the 2008-2009 academic year
Does not meet expectations	1	24 credit hours for the 2008-2009 academic year

* Indicates FPL and/or teaching release time as follows:
*1 Five hours release time from General Clinical Research Center
*2 Three hours SRA
*3 Three hours MBI release time
*4 Faculty Professional Leave combined with Fulbright Scholar for two quarters, three hours additional release time from the MBI for the other quarter
*5 Faculty Professional Leave for two quarters
*6 Six hours release time from externally funded grants
*7 Three hours release time from General Clinical Research Center
*8 Three hours release time from the MBI

Benchmark Research Support Staff

Big Ten Public	# of faculty	# of grad students	# of IT staff	# of technical staff
Illinois	7	47	0.5	N/A
Indiana	31**	0**	1	N/A
Iowa	33*	117*	5***	N/A
Michigan	51*	205*	1.5***	N/A
Michigan State	24	26	1.2	N/A
Minnesota	38*	134*	Unable to Contact	N/A
Ohio State	25.4*	115*	2.5***	N/A
Penn State	26	82	Unable to Contact	N/A
Purdue	35	79	5	N/A
Wisconsin	54*	142*	9***	N/A
Average	32.44	94.7	3.21	N/A

6. Alignment with the Academic Plan

Build a World Class Faculty
The quality of the MPS faculty equals or exceeds that in any other college on the Ohio State campus (see our "Strengths" – section 5a.) Our challenge is to maintain and enhance this strength in a deficit situation and while many retirements are anticipated.

Define Ohio State as a Leading Land Grant University
MPS faculty are world-renowned for their research on global climate change. Ohio State is part of the consortium building the LBT which, upon completion in 2012, will give our faculty and students access to the most advanced optical telescope in the world. The Department of Physics and the fields of algebra/number theory/algebraic geometry, condensed matter physics, cosmology/relativity/gravity, discrete mathematics and combinatorics, nuclear physics, and paleontology are ranked in the Top 25 by U.S. News and World Report (USNWR.) Astronomy and statistics are not rated by USNWR. We are confident that these two units will be rated as top 20 departments in the coming NRC review. (see our "Strengths – section 5a.)

Improve the Quality of the Teaching and Learning Environment
The College of MPS plays a central role in the education of students in all STEM fields at The Ohio State University. Every major program in the college offers outstanding preparation for careers in the physical sciences and mathematics. In addition to the STEM major programs offered, introductory coursework in the college forms the foundation for majors in STEM disciplines outside the College, particularly for majors in Biological Sciences and Engineering. Each year, thousands of students enroll in and complete MPS course work in preparation for or as part of major programs in all STEM disciplines. The College must continually examine its course offerings and pedagogical methods to ensure that all Ohio State students receive the very best possible preparation for STEM careers.

Units within MPS have been changing the foundations of introductory and intermediate courses based on new understanding of how students learn. Recently, Statistics 135 has been modified to a "buffet" approach which accommodates a variety of student learning styles. Chemistry, in a statewide collaborative effort, has inaugurated a program of Research Experiences to Enhance Learning (REEL), which incorporates authentic research experiences in all introductory chemistry courses. This effort is designed to increase interesting science and to improve retention to degree in STEM majors. The program is expanding to the organic chemistry courses, themselves key for chemistry and pre-health majors. In addition to the planned inclusion of research experiences in organic chemistry, the lectures and associated laboratories are themselves undergoing modernization. The mathematics department has instituted a new introductory calculus sequence designed to appeal directly to engineering students and is also offering experimental sections of calculus directed at Biological Sciences students. Other reforms proposed by mathematics are detailed in Section 5. The physics department has changed the style and structure of its introductory coursed to blend laboratory experiences into the activities conducted in recitation sessions. It is necessary to blend new technology, new ways of approaching the material and new learning environments to bring this about. This blending will eventually also incorporate the lectures. Earth Sciences has developed new contexts for its introductory geology classes and has revamped its laboratories, for example, to include new activities, such as using state-of-

the-art geographical information system (GIS) exercises. All the pedagogical efforts described herein are designed to make the choice of a major in STEM disciplines more attractive for students and to provide more effective preparation for upper level courses.

The ongoing efforts at modernizing and reorganizing the introductory and intermediate courses in the college will lead to improved learning and retention, and should be very helpful with recruiting additional students into the STEM areas. For our own majors, we are currently expanding the internship and research opportunities that will be available to connect them to real-world career possibilities.

Enhance and Better Serve the Student Body

As the university has steadily improved the pool of admitted undergraduate students over the past thirteen consecutive years, the quality of the MPS undergraduates has similarly improved. These high-achieving undergraduates choose STEM majors in increasingly larger numbers each year.

MPS applicants and enrollees are significantly higher achieving than the university freshmen as a whole. For autumn 2007, the new MPS freshman had an average ACT of 28.2 and an average SAT of 1277. Of the current MPS freshman class of 245 students, 107 are honors students (ACT$\geq$ 29 and top 10% of high school class.) For autumn 2008, the 129 admitted MPS applicants have an average ACT of 28.7, up from the 28.0 of the admitted 2007 class.

The profile for the class now applying for autumn 2008 thus shows the continuing improvement in the numbers of MPS students. From a recent low of 1275 MPS student majors in 2005, MPS majors have increased to 1389 in autumn 2006 and 1518 in 2007. The college has the capacity to serve greater numbers of undergraduate majors in our own units but the college is straining to offer the needed sections of chemistry and calculus for the total number of students in the STEM majors. The number of biology majors has been steadily increasing for the past ten years and, since 2001, biology has been the #1 or #2 major at the university, with 1731 undergraduate majors in autumn 2007 (4.41% of all majors.)

Serving our own students has been a focus of the college particularly since spring 2005 when the college hired a Director of Professional Programs and a Director of Student Services. These professional staff members have created a variety of programs to enhance our recruitment of new student majors and to improve retention of current majors. Recruitment events/programs include an annual autumn open house, jointly hosted with the College of Engineering, for 550 high school seniors and their parents. The College hosts a variety of smaller recruiting events (e.g., Honors Days, Dessert with the Dean) for prospective Honors majors in the college. The college plans for AY 2008 to initiate novel recruiting events for women and minority students in conjunction with professional staff from UAFYE. Retention events which the College has sponsored include Cohort Events organized by the Mathematics Department for the autumn quarter NFQFs in Calculus 151, 161, H161 and H190. In June 2007, the College organized a phone-athon to welcome to the autumn 2007 class all the women NFQFs. The College will continue this event in future years. The College has hosted several social events for women students and faculty (e.g., coffees, ice cream socials) and will continue these retention events in the future.

The professional experience program includes individual and group career advising, career exploration and preparation workshops and panels, and listings of announcements, job leads, and employer information. The program supports the academic units by providing information on major-specific employment trends, workshops on resume writing, job search and networking skills, and interviewing techniques, and industry related career panels with MPS alumni.

Created last year as an avenue to prepare students for face-to-face meetings with recruiters, the *Exploring Possibilities with Math and Science* program will run again in 2008. More than 100 students participated in the week-long series of programs and information sessions.

In year three, the professional experience program will focus on building partnerships with employers and alumni for internship development.

Create a Diverse University Community/ Response to the Report of the Diversity Council
The college values a diverse faculty, staff, and student body and is committed to enhancing our diversity within a welcoming and accepting climate. MPS has the continuing goal to build and retain a diverse world-class faculty.

In January 2007, Dr. Anne E. Carey, Associate Professor in the School of Earth Sciences, joined the MPS college office as a Faculty Fellow and in October, 2007, was appointed Associate Dean for Student Affairs. Dr. Carey's primary responsibilities include undergraduate student recruitment, Women in Mathematics and Science, MPS Undergraduate Research Forum, coordination and development of College-wide undergraduate major programs, and serving as chair of the college diversity committee. The Diversity Committee will respond to university requests for reports and analysis. It will also serve on special projects as requested by the dean. These may include climate studies and other study and analysis of issues of concern to members of underrepresented groups. The Diversity Officer for the college will advise all search committees with pool data of women and minorities. Each search committee's EEO/AA officer will ensure that the pool of candidates for a faculty position reflects the pool nationally and that those committees aggressively pursue women and minority candidates.

For the past four years, MPS has aggressively identified women candidates for faculty searches and recruited women to its faculty. Thus, during 2002-2006, the number of women on the MPS faculty was increased from 18 to 31. That number has since declined to 30 with a recent retirement and women currently constitute 13.3% of the total college faculty of 225. This significant increase of women faculty has had a salutary effect, particularly on the women members of the faculty and on the women students.

MPS has not achieved the same type of progress in recruiting minority faculty. In 2006, the college hired one Latino assistant professor, who joined MPS at the Mansfield campus. This argues for a new strategy: to grow our own faculty by identifying and aggressively recruiting minority students to the ranks of faculty. For the current year, the college is identifying African-American scientists for faculty and administrative positions in the college.

The College of Mathematical and Physical Sciences has recently hired an African-American assistant dean, Dr. Oludurotimi Adetunji, a new Ph.D. in physics, whose primary responsibility is recruitment and retention of under-represented minority students. He has been actively engaged in recruiting

African American, Hispanic, and Native-American graduate students and has developed several novel programs in our college as part of that endeavor.

Part of Dr. Adetunji's portfolio as assistant dean includes being lead administrator in the College's *grow our own* concept for increasing the number of under-represented minorities choosing to be majors in our MPS departments. He has established relationships with middle and high schools of the Columbus City Schools, developed partnerships with organizations dedicated to minority affairs, and established relationships with people and groups at Ohio State committed to improving Ohio State's diversity (e.g., Office of Minority Affairs, Undergraduate Admissions and First Year Experience, Program for Advising in Scholarship and Service).

Dr. Adetunji's responsibilities include addressing Ohio State's efforts to ameliorate a national problem—the very few Ph.D.s granted to men and women of color in the STEM fields. For 2006 (the last year for which data are available), reports by the National Science Foundation state that only 2.1% of the Ph.D. degrees awarded in all STEM disciplines went to African-American women, 2.1% to Hispanic women and 0.1% to Native American women.

Other, longer term data compiled by the National Science Foundation show that from 1994 to 2004 there were 46,282 Ph.D. degrees awarded nationally in Physical Sciences and Mathematics. Of those degrees, 1628 degrees, only 3.5%, were awarded to under-represented minority students and more than half of those degrees were in chemistry (912). This extremely small pool of candidates nationally makes recruiting of under-represented minority faculty a challenge, particularly in astronomy and physics. NSF compiles Earth Sciences data separately (with atmospheric and ocean sciences), and in that group, only 222 Ph.D.s (3.2% of the Ph.D. degrees in those fields) were awarded to under-represented minority members, making Earth Sciences another academic area where the very small pool makes recruiting faculty a challenge.

There is optimism, however, because for the last several years, since the data cited above were compiled by NSF, the numbers of Ph.D. degrees awarded to under-represented minorities has increased. In his effort to find solutions to the national problem of low numbers of Ph.D.s awarded to minority students, Dr. Adetunji made several suggestions to the Chemistry diversity committee. These include the importance of building research based relationships with under-represented minorities chemistry faculty in top historically black colleges and universities. He recommends that this would not only lead to the hiring of highly qualified under-represented minorities faculty but also improve the ability to attract under-represented minority students to our graduate programs. The College has had three units (Chemistry, Earth Sciences and Statistics) participate in mentoring Summer Research Opportunities Program (SROP) fellows in Summer 2008, a program for under-represented minority undergraduate students in science and mathematics, coordinated by the Graduate School.

Another of his efforts in retention of our current African-American undergraduate major students has been to establish, in collaboration with undergraduate students in science majors, a student organization called the Society of Black Scientists, He has also been recruiting black graduate students, postdoctoral researchers and faculty in the sciences as honorary members of this organization where they will serve as role models for our black undergraduate students and encourage the students to pursue graduate or professional degrees. His responsibilities for recruitment and retention of under-represented minority students have been recently extended to the College of Biological Sciences. He has taken the lead in developing a new graduate recruiting brochure targeting under-represented minority students in Biological, Mathematical, and Physical Sciences.

Women are considered under-represented minorities in physical sciences and mathematics. The College would like to highlight that it has been aggressive over the past several years both in recruiting new women faculty and in promoting the women faculty already here. In 2000, 15 of 222 FTE in tenure-track positions in the College of Mathematical and Physical Sciences were women (6.8%). By 2007, 30 of 225 faculty FTE were women (13.3%). The college has recently hired a woman as a full professor in the Department of Mathematics. Three women associate professors have recently been promoted to full professor (in Astronomy, Chemistry, and Earth Sciences), effective October 1, 2008. In 2007, the college appointed a woman faculty member to Associate Dean. Two women faculty members have participated in the President's and Provost's Leadership Institute. The College has made efforts to enhance women in leadership positions. Efforts to that end include the recent participation by one faculty member (in 2007) and one African-American professional staff member (in 2008) in the HERS Bryn Mawr Summer Institute for women in higher education administration.

College endowment scholarship funds in Spring 2008 were targeted to increase the College's yield of high-achieving women and minority students admitted as freshmen for Autumn 2008. Achievement scholarships were offered to 21 female students; eight of whom were targeted minorities. The acceptance rate for the targeted female minority students was 38% and the acceptance rate for the Caucasian female students was 92%. In addition, three scholarships were offered to male targeted minority students with a 67% acceptance rate. This targeting was done to improve the pool of women and minority majors in MPS departments and has yielded good numbers of students. Increased availability of development funds would improve the yield of such targeted students in future years.

As part of a multi-year cohort study of all women assistant professors (n=50) hired in 2001 at Ohio State, the university in 2004 conducted a campus-wide survey of assistant professors which queried opinions on tenure, nature of work, policies and practices, and on collegiality, community and culture. The survey showed that significant differences existed (independent sample t-tests) between MPS junior faculty and non-MPS faculty in the areas of Expectations Regarding Research, Research Services Provided, Interest Taken by Senior Faculty, Sense of Overall Fit, Intellectual Vitality of Senior Colleagues, and Fairness in Treatment Received Between Junior Faculty, The last four points are deemed important in that they are factors most strongly associated with overall job satisfaction university-wide in the COACHE survey, last conducted in 2007 of the 2006-07 cohort of 10,469 tenure track assistant professors (6159 respondents) at 80 colleges and universities. In the Ohio State survey conducted as part of the cohort study, the female respondents rate the informal mentoring which occurs in MPS as more effective than did the male respondents. The female respondents also ranked the formal mentoring more effective than did the male respondents, but the difference was not statistically significant due to the small number of respondents. MPS junior faculty indicated an effectiveness gap for Grant Assistance and for Formal Mentoring (the gap being defined as the proportion within respondents who indicated an element was important and also rate it as ineffective at Ohio State.)

Additional mechanisms for retention and advancement of women faculty include participation of MPS women associate professors in the first two cohorts of the President and Provost's Leadership Institute (PPLI.) The MPS member of the initial PPLI cohort has completed her training, has been promoted to full professor and continues to make her mark as a world-class researcher and leader in her field, including as the editor of a prestigious chemistry journal. Anne Carey, a member of the second PPLI cohort, also participated in the 2007 HERS Bryn Mawr Summer Institute for Women in Higher Education.

The college is a major participant in the recently submitted (December 2007) proposal, *Comprehensive Equity at Ohio State(CEOS)*, to the National Science Foundation's ADVANCE program. CEOS proposes to increase the recruitment, retention and advancement of diverse women faculty in the STEM disciplines by addressing cultural barriers to equity for women and members of historically underrepresented groups, including women with disabilities. The proposal is directed at making long-term cultural changes within units. Women of color are badly underrepresented in the STEM disciplines. Of all doctorates awarded nationally in STEM fields in 2006, African-American women received 2.1%, Hispanic women 2.1%, Native American women 0.1% and Asian-American women 3.9%. Their representation on the STEM faculties of research universities is even worse; the top 50 research universities collectively had only one female minority Full Professor in the physical sciences and engineering in 2003. Recruiting and retaining women of color requires concerted systemic effort, starting at the highest levels of the university. The CEOS proposal articulated ambitious goals for the four colleges (Biological Sciences, Engineering, MPS, and Veterinary Medicine) involved, and the hiring of diverse faculty the proposal seeks will include diversity in MPS. Quantitative proposal goals are shared by among the four colleges but can be semi-quantitatively expressed for MPS portion alone as:

- Retain all of our current female Assistant Professors through promotion to tenure
- Of all faculty expected to be hired, one-third should be women
- At least one of the new faculty members should be African-American, Hispanic, Asian-American or Native-American women
- At least one woman should be hired at the rank of Professor
- Mentor all female Associate Professors to enhance their dossiers with a view to promotion to Professor
- Appoint at least one additional woman to be Associate Dean or Chair

Help Build Ohio's Future

The College of MPS benefits from TIE support in the area of Advanced Materials and this is being leveraged to gain support of an Ohio Scholar in Biomaterials. This area is closely aligned with industry and is crucial to developing a new economy in Ohio. The Department of Chemistry proposes cluster hires in the areas of energy, materials, and life sciences, three areas with important connections to the modern economy.

7. Alignment with Presidential Priorities

Forge One Trans-Institutional University

The College of MPS benefits from its collaborations with the College of Engineering (CoE) in joint undergraduate recruiting efforts. MPS and CoE host an Open House in September for 500-550 students and their parents. The students attending these events have expressed an interest in the major programs offered in MPS and CoE. The prospective students are largely from Ohio and contiguous states and all meet the requirements for acceptance to the university and the CoE. In addition to these local and regional students, the event has hosted underrepresented minority students invited from around the country.

We work with several colleges through various TIE programs and university centers such as IMR, BPRC, and the IEE. We are open to recruiting faculty with joint appointments in Engineering and Biological Sciences and other colleges and see this not only as a strategic way to make interdisciplinary hires but also as a pragmatic way of handling start-up costs.

Putting Students First

MPS is committed to putting more tenure track and clinical track faculty (rather than short term lecturers) in front of introductory students, particularly in chemistry and mathematics, and to improving the first to second year retention rates of STEM students. One strategy will be to provide rewards for faculty whose strength is undergraduate teaching (see the point below). MPS will also seek to formalize a teaching track for faculty. Several of our auxiliary faculty have a decades-long commitment to undergraduate education. We wish to formally acknowledge their contributions and to replace short-term lecturers with indivisuals with a long-term commitment to Ohio State and to undergraduate education. We want to create in MPS a track for individuals who seek "liberal arts college professor" employment. We believe this conversion can be accomplished in a cost-neutral manner.

We will also attempt to further introduce research components into our undergraduate teaching, Chemistry's REEL program is the model.

The college has in the last several years enhanced its student retention efforts to address its low retention rate. Our efforts are too recent to be able to assess their effectiveness, but we plan to monitor retention data over the next two years. Examples of these programs include the hiring of the Director of Professional Programs and the Director of Student Services. Novel academic programs in the college include creating cohorts of NFQF MPS majors in autumn quarter through enrollment in a subset of the Math 151 sections reserved only for MPS majors. These sections are taught by regular, tenure-track faculty or by the newest instructors. The college sponsors some of the activities of the newly organized Women in Math and Science (WIMS) undergraduate student club.

Several of the units have recently created or are proposing new undergraduate major programs. These include programs in computational science (joint among several units), Earth System Science (in SES), Earth Observation Sciences (in SES), financial mathematics (in Math), and programs for students who aspire to teach science or mathematics in high school (all units jointly with the College of Education and Human Ecology.)

Retain, Attract, and Reward World-Class Teachers and Researchers

At one extreme, MPS can have a larger number of tenure track faculty with relatively poor compensation or a smaller number of highly compensated faculty. Given that choice, MPS will always opt for the latter, even if that means reducing the global number of tenure track faculty, staff, and teaching assistants.

MPS is committed to differential raise pools distributed to the six units based on quality and benchmark analysis. We eagerly await the results of the current NRC reviews to inform the next salary process. Four of the six units in MPS have average faculty salaries near or above benchmark averages.

MPS has historically rewarded research over teaching in salary reviews as is typical in a research university. MPS is committed to allowing all faculty to play to their particular strengths and to reward those strengths. Faculty will be encouraged to negotiate higher teaching loads in exchange for a greater weighting of teaching to their annual performance evaluations. Faculty who do more teaching and provide high quality teaching *will be rewarded.* This differential teaching load is already in place in at least one unit in the College and has been quite successful.

Recast our Research Agenda
MPS is pro-active in recasting its research agenda. Mathematics will jointly recruit new faculty with the Comprehensive Cancer Center to hire scholars interested in modeling tumor growth. It is widely believed that the next breakthrough in cancer research will come from mathematics and statistics and MPS faculty will play a large role in this research. Members of the Statistics faculty routinely collaborate with researchers from the College of Medicine to provide their insights. Chemistry will focus its new hires around the themes of energy, materials, and life sciences. The School of Earth Sciences is justly famous for its research on global climate change and this research thrust will continue with the support of CWC TIE funding and expand to encompass water related research as well. The research agenda in Astronomy and Physics will also be driven by TIE investments such as the search for Earth-like planets in other solar systems, research into the origins of the universe (CCAPP) and research on Advanced Materials. The latter research, done in collaboration with CoE, has short- and long-term potential for revitalizing the economy of the state of Ohio.

Commit to our Communities
Despite our immediate fiscal pressures and with the help of the ASC Federation, MPS has provided assistance to the Metro School by funding two graduate teaching assistants (from chemistry and physics) to support instruction. We are working to create internships for Metro and other high school students in the 2008-09 academic year and beyond and to manage the liability issues that such internships present. MPS continues to support the Wonders of our World program, which sends faculty and student volunteers into community schools and has produced dramatic gains in science proficiency test scores. We will continue to make these programs strategic priorities in the face of tight budgets.

Simplify University Systems and Structures
The College of MPS applauds this goal and feels that much can be done centrally to unleash the entrepreneurial abilities of its faculty. MPS will do its part as well. For the first time, every unit in MPS has posted a simple operational budget on the web for inspection by faculty and staff. Each Chair/Director is required to have an annual meeting to explain the budget to the faculty and is encouraged to appoint a budget committee. The college has also published its functional budget. We must now establish principles for sharing start-up costs with units, determining the appropriate faculty size target of each individual unit as limited globally by tuition and subsidy, providing chairs and directors with simple useful budget information and tools and providing units with incentives for managing their resources efficiently.

8. Capital/Development Priorities

a. Chemistry Facilities ($23m)

The top capital/development priority for the College of Mathematical and Physical Sciences is to raise private funds to build a new chemistry building as part of a Chemistry and Chemical Engineering Complex. The chemistry portion of the building will house both synthetic chemistry and biochemistry. This will allow Chemistry to retire Evans and Johnston Laboratories and to co-locate Chemistry and Biochemistry.

b. Endowed Chairs/Professorships ($8-10m)

In order for MPS to reach its objective of a top 20 status for all MPS departments, it is imperative to raise private funds and for greater urgency in development activity. It will be a priority to make the CWC, CCAPP, MBI and ENCOMM (Advanced Materials) TIE's self sustaining by the time central cash support is discontinued in FY2013. The TIE's are the source of MPS "big ideas" to excite donors, our assets include naming rights to departments and laboratories and our goal will be to raise endowments for chairs and professorships, technical staff, and graduate fellowships. The units currently best poised for endowed chairs and professorships include the School of Earth Sciences and the Department of Astronomy and increased development resources and activity is crucial to realizing the aspirations of these units.

c. Cockins and Mendenhall Renovation

Over the next four years, the College will begin to prepare for renovation projects for both Mendenhall, Orton, and Cockins Hall. Without the renovation, these two facilities will impede the recruitment of students and faculty. As we prepare for the renovation projects, we will parallel a private fundraising strategy to target donors interested in these projects. We will begin work now with FOD to estimate these project costs.

d. Imaging Sciences Laboratory ($1m)

We are in the process of preparing to ask a current college donor to name the ISL in the Department of Astronomy. The privately funded gift will support staffing and resources for the laboratory.

e. Discovery and Prospect Qualification

The College of MPS currently raises $3 million annually towards college priorities. To see significant growth in this area, we need to focus efforts on the development of new prospects. We will focus on a plan to include intensive work on building new relationships with top capacity donors for future growth of the college.

Prior to the new administrative leadership of the university, MPS developed a campaign goal of $25 million that included some of the priorities listed above. In collaboration with the new leadership in Central Development, we will continue to work toward these priorities and establish an updated campaign goal and staffing structure that will provide an effective and significant return on investment.

9. Revenue and Expenditure Analysis

a. General Considerations

The College leadership is committed to fiscal integrity supported by responsible budgeting practices in the College of Mathematical and Physical Sciences. Since FY05, the College has had an annual general funds operating deficit which has led from holding a cash reserve in FY04 of $12 million to a negative $6.7m balance at the end of FY07. Bringing the annual operating budget for the college into balance will not be an easy task since the College must maintain its excellent teaching and research efforts along with faculty and staff morale. Also, the university has made great strides in attracting outstanding undergraduate students who take many important courses in our College. We've also worked hard to decrease the time to degree for undergraduates. MPS cannot allow its response to its current financial difficulties to reverse those trends. Thus, this plan lays out a roadmap for creating a balanced budget with a combination of revenue growth, cost constraints and budget reallocations.

Over this same time period the base budgets of the departments will be realigned. The College leadership recognizes that it is not desirable, nor practical, to create a budget system where each department is expected to be self-supporting from a financial standpoint. However, over the last several years the amount of cross-subsidies among the departments has led to financial imbalances that are unsustainable and must be redressed with the growth of some departments at the expense of others, imposing laboratory fees, increasing IDC generation and development activity, and implementing cost containment measures.

The college recognizes the need for tuition and state share of instruction (SSI) cross-subsidization amongst the units in MPS. This need arises from the compromises that inevitably occur while goals in the Academic Plan are pursued using (necessarily) limited total resources. The College will take responsibility for managing the overall balance of the tuition and SSI cross-subsidies and will not institute a strict policy of "each boat on its own bottom" at the departmental level. The college will strategically invest in a few priorities; the Large Binocular Telescope, The Byrd Polar Research Center, The Institute for Materials Research, Interdisciplinary Graduate Programs, etc.

However, it is also clear that operations in each unit must be correlated in some way to the resources the unit generates so that units with large teaching missions can provide high quality instruction. The absence of such a correlation has caused units, quite naturally, to focus exclusively on expanding the size of their operations without consideration of fiscal consequences: certainly a larger number of highly qualified faculty and staff in a unit will produce a greater amount of superior research and enhanced teaching experiences to the students in that unit. But a total lack of correlation between a unit's expenditures and revenue has directly led to the financial deficit that MPS is currently experiencing and the challenges faced by chemistry and mathematics to meet the needs of its students.

Thus, MPS must develop sound and understandable budget distribution principles, including the development and use of a multi-variable formula for such distribution that is based on optimization of the following principles; (a) transparency, simplicity and predictability, (b) identifying and funding of college-centric priorities (c) setting high but realistic performance goals based on objective measures that encourage and support the aspirations of 6 diverse units, (d) devolving additional authority and responsibility to the department chairs and school

director to meet performance goals and (e) and rewarding high unit performance as defined by objective measures.

The commonly held goals of the Academic Plan serve best to illustrate why the connection is desirable. There is obviously no "natural" size for any academic unit although surely there is a threshold value that defines the minimum number of faculty needed to operate a high quality program. The number of students choosing to take courses in an academic department should inform but not dictate the number of faculty members, graduate students, and staff in that department, if the Academic Plan's promise of a quality learning experience for its students is to be honored. Similarly, a significant measure of a department's research excellence is found by comparing its external funding profile to its peer departments in other universities.

However, a connection between the size of a department and its teaching/research output will be necessary to achieve our goal of a balanced budget in FY2012. Achieving transparent levels of subsidy was an important recommendation of the Proctor Report.[1] This section is our attempt to respond to that recommendation. This alignment (or lack thereof) can be easily measured using the base budget allocation model Ohio State currently uses: a department generates revenue through student credit hours it teaches and IDC created by its faculty's grants, and it expends money, primarily, on personnel (faculty, graduate students, and staff). We will use these measurements to institute a *balance principle* amongst the departments in MPS.

The basic departmental fiscal balance principle has three tenets:

(i) Each unit must seek alignment of its financial *sources* and *uses*.

(ii) In FY2012, no unit will be subsidized by more than a defined target of its *modified total Revenue*.

(iii) In FY2012, no unit will have more than a defined target of its modified total Revenue withheld by the College for cross-departmental subsidization.

The modified total Revenue (denoted R) of a department will be determined using the base budget model for General funds allocation at the university. This will represent the *sources* for the department. To determine R, the Total Resources[2] of the department will first be computed, then the department's share of MPS university commitments[3] and central College commitments[4] will be subtracted. The general ledger account of the expenditures (denoted E) of a department will be used as the measure of the *uses* by the department.

This general approach of accounting for the sources and uses for a department will not change. But the category of "central College commitments" is somewhat plastic and the items in this category change over time. A provisional list of the current items in this category is used to produce the table below, but the list itself is subject to change. In general, the MPS

[1] The Proctor Report was commissioned by OAA in 2007 to study the finances and operations of MPS.

[2] The resources come from State subsidy and fees from students (allocated by student credit hours), and IDC (allocated as a function of amount of sponsored research grants).

[3] These commitments include the Research administration allocation, student services allocation, and the Central tax.

[4] College strategic priorities that are designated for central funding include operation of the College office, TIE expenses, the LBT, the IMR, Interdisciplinary Graduate Programs and the Byrd Polar Research Center.

administration will work with the Department Chairs and their fiscal officers so that they completely understand this sources and uses computation, and how the variables entering the computation are found; this will include an explanation about the items appearing in the "central College commitments" category.

The difference between E and R represents the amount by which a department's uses differ from its sources --- a department's uses exceed its sources if E-R is positive and its sources exceed its uses if E-R is negative. The quantity $S = \frac{E-R}{R}$ then represents the fraction of a department's total modified Revenue that it either receives as a subsidy (if S > 0) or is withheld for another department's subsidy (if S <0). Note that S=0 means that a department is in exact financial balance. As a convenient shorthand, we call S the *Subsidy %* of a department below.

Each department's modified total Revenue, Expenditures, and Subsidy % for FY07 are listed in the following table, along with each department's Subsidy % for FY02:

Table 8

FY07	Modified total revenue	Expenditures*	Subsidy %	FY02 Subsidy %
	dollars in thousands			
Astronomy	$ 3,173	$ 4,683	48%	45%
Chemistry	$ 14,652	$ 17,640	20%	-4%
Mathematics	$ 20,890	$ 16,291	-22%	-17%
Physics	$ 12,025	$ 17,957	49%	26%
SES	$ 3,877	$ 5,649	46%	49%
Statistics	$ 6,891	$ 6,816	-1%	6%

(*) The expenditures listed are modified from the general ledger record, to account for projects designated for central funding that currently appear as expenditures associated with those departments, e.g. LBT.

The College will work with each unit to develop customized plans designed to lead that department to the targeted subsidy level. These plans will be a blend of expenditure reductions and resource generation targets that are suited to the department's particular characteristics. The College will monitor each Department's progress along its own plan and annually assess each department's progress toward the targeted Subsidy %.

We set as a goal that chemistry will have a Subsidy% less than 5% by FY2012 despite a growth in its faculty size. This will be accomplished by reaching the Big Ten Public average of IDC recovery/faculty member, reduction of the number of teaching assistants deployed per undergraduate

and the introduction of laboratory fees. We set as a goal that physics will have a Subsidy% of less than 20% by FY2012 using the same tactics listed for chemistry, in addition to a small loss of faculty.

Chemistry and physics are part of disciplinary based data exchanges which allow for ready calculation of IDC recovery/faculty member. This is less true in other MPS units. At this time we cannot easily obtain the comparative data needed to set Subsidy% goals in astronomy and earth sciences. We expect that the Subsidy% in astronomy and earth sciences will exceed those of chemistry and physics in FY2012. Once these values are defined it will be possible to define the level at which mathematics and statistics will *provide* subsidy.

We emphasize again that there are two variables involved in computing a unit's Subsidy % --- sources and uses. The primary ways that a unit can enlarge its total pool of sources are: increase its IDC on sponsored grants, attract more students to its courses, institute lab fees where appropriate, and increase its development funds via new donors[5]. Growing sources of revenue in any of these ways is, of course, challenging. However, in the case of highly subsidized, but highly productive, units, enlarging its pool of resources may be an attractive alternative to solely downsizing its operations. Additionally, there are innovative ways to approach all three ways of revenue growth, unique to each unit, which are consistent with the Academic Plan and our own ambitions; for example, attracting more students to our courses by the creation of new Masters programs.

Decreasing expenditures inside a unit will be the companion action to growth of modified total revenue, and will be achieved by rebasing. Several units in MPS will necessarily be required to scale back their uses of general funds in order to reach their Subsidy % target. But here, as with growth, innovative ways to proceed exist, including redeploying the number of graduate students used as TAs, choosing novel ways to deliver undergraduate instruction, and reorganizing the support staff within departments.

At the unit governance level, there will need to be an ongoing discussion about what mixture of expenditure reduction and new resource generation will produce the targeted subsidy levels, and still allow the unit's scientific mission to flourish. For highly subsidized units, particularly, the starting point must be that the current level of operation, measured by the difference between expenditures and resources, is unsustainable. Those units must choose methods for closing the gap between E and R to a defined, sustainable value.

b. Budget Principles

The College intends to move to a model in which salaries of all faculty, teaching and academic administrative staff and graduate teaching assistants are supported by net revenues generated by tuition and subsidy. When the fiscal plan is fully implemented in 2014, net indirect cost recovery revenue will be decentralized to the departments where it is generated. These resources will be used by the departments to finance research support costs, such as start-up (as allowable) and renovation costs of new faculty, subsidizing shared services (i.e. machine, electronic, and glassblowing shops), and providing cost share resources for newly submitted proposals.

[5] Development funds are distinct from General funds on the general ledger. So, actually, this action would decrease expenditures of a department, rather than increase total modified Revenue, by allowing operations currently funded by General funds to be shifted to development funds.

In addition, departments will be encouraged to increase the amount of release time reimbursements received from sponsored research projects (when allowed by the sponsors). These resources will help the departments to offset any reduction in general funds used to directly support sponsored research.

Also, the College will move to a model in which all salaries and a few key central priorities (i.e. LBT, Byrd Polar Research Center, Institute for Materials Research, IGPs, etc.) are centrally funded by net revenues generated by tuition and subsidy. After these costs are financed, the remainder of funds will be distributed by formula to units based on credit hours of instruction, differentiated by the cost of instruction. The unit leadership will annually propose budgets to the college for final approval and will have substantial discretion to align their budgets to support the instructional mission and research priorities identified in this document. This will include strategic sizing of the number of teaching assistants and instructional and administrative staff within each department. Those units that can deliver instruction and support their research priorities within their allotted budget will have the discretion to reinvest the funds released by the re-sizing within their unit. However, given the volatile nature of IDC generation these resources are not to be used to back permanent commitments. This means that if staff members are hired and paid exclusively by IDCs then a unit must be willing to part with those staff members should IDC generation decrease unexpectedly. The college will also consider centralizing administrative functions for small units.

When the fiscal plan is fully implemented in 2014, annual rate vacated by staff attrition will remain associated with the unit and may be reinvested in new staff, additional graduate teaching assistants or other needs.

Annual rate vacated by tenure track faculty attrition will be returned to the college and saved to finance College priorities and generate start-up funds for new faculty. Ultimately the annual rate will be reinvested in hiring faculty in a manner consistent with the priorities outlined in this document. After this plan is fully implemented, annual rate vacated by assistant professors who are not awarded promotion and tenure will remain in the departments. There shall be no financial "incentive" to promote faculty to preserve a salary line in any MPS unit.

c. New General Fund Resources Through 2013

We anticipate that the General Funds budget funded by annual rate will grow at a rate of 3% per year over the next four years, which is a conservative estimate given that this budget has grown at a 4.8% compounded annual rate since the advent of the new budget system in 2003. Also, the Physics and Chemistry departments will each have as a strategic indicator achieving the average level of IDC generation/faculty for the Big Ten. Although we are setting this goal, to be financially prudent we are planning expenditures based on only modest, historic levels of IDC growth. If we do reach our target values of IDC/faculty member, we will adjust our expenditures accordingly in subsequent versions of the college strategic plan.

The 3% rate was chosen for planning purposes over the historic 4.8% rate given the difficult economic environment that appears to be on the horizon for Ohio combined with Ohio's desire to restrain tuition growth for state supported institutions. This rate of growth would produce $9.1 million in new incremental resources produced by state subsidy, tuition and indirect cost recoveries net of university taxes and assessments by 2013. The total PBA budget is projected to be $85.2 million at that time.

These assumptions and projected outcomes were confirmed by the financial tool recently provided by OAA.

Additional revenue enhancements are also projected. Lab fee proposals for undergraduate Chemistry and Physics courses were approved by the Board of Trustees and were assessed beginning autumn quarter of 2008. These fees are designed to support the higher cost of instruction in these disciplines. If approved, we intend to increase these fees $50 per year until they reach $200 and hold them at that level for the foreseeable future. When the fees reach the $200 level, it is projected they will generate $4.5 million per year. The School of Earth Sciences is also considering the possibility of a lab fee for its high-cost undergraduate courses.

Combining the anticipated growth in net general fund revenues with the revenue generated by the proposed lab fees for Chemistry and Physics, it is anticipated the college will generate $12.5 million in new general fund continuing resources by 2013.

d. Uses of General Funds Resources

Faculty –

Assuming annual salary and benefit increases of 3.5% per year, and the hiring plan as presented above, MPS will invest over $3.4 million in incremental continuing resources in its faculty through 2013. The College currently has ~220 full time tenure track faculty members and will seek to maintain that level through this time period (within plus or minus 4). Any growth of the faculty above this number will be funded by the ORSP and development. While it is impossible to predict attrition with any certainty, we anticipate losing 41 members due to retirement or resignation over this time frame. By replacing these senior level faculty members with junior faculty members at the assistant or associate level we project a net savings in salaries and benefits of $1.1 million in continuing resources.

However the distribution of faculty members among the departments will change with this replacement plan. This is one of the strategies that will allow the departments to meet the sources and uses targets described in the previous section. As previously mentioned, Table 1 demonstrates one scenario of how this may occur over the next five years. The figures in the table are estimates based on a combination of the experience of the past four years and analyzing the faculty members on track to become retirement eligible within the next five years. Please note that Table 1 does not include hires made from TIE resources provided by OAA funds or ORSP faculty hires or the deployment of new (post 2008) endowed chairs and professorships.

Table 1 differs from the April Strategic Plan in that it spreads the same number of faculty hires over 5 years instead of 4. To reduce the debt, MPS now plans to delay 3 faculty hires until 2014, and delay 3 previously programmed hires by 1 year. This is part of the MPS share of debt reduction as detailed earlier.

The faculty targets for each department have been determined by our guiding principle that it is crucial that all six MPS units thrive, believing that the loss of quality in any unit will have negative consequences for all MPS units and the university. The changes given in Table 1 are consistent with the recommendations of the External Review Committee.

As for the startup costs for the replacement hires, the College cautiously anticipates that revenue generated by Indirect Cost Recoveries (IDCs) will grow at an average of 3.5% per year, generating $273,000 in incremental annual rate revenue between 2010 and 2013. At that time the College will then have $2.1 million in net IDCs set aside as a PBA reserve to partially finance start-up costs. We fully intend to set this amount of annual rate aside and decentralize it to the departments in 2014, and then give the leadership of the departments the authority and responsibility for deciding how best to employ these resources to finance startup packages and other research support costs.

Until that time, these resources, along with those provided by Arts & Sciences, will be used to help finance the startup costs of the 37 tuition and SSI supported new faculty members to be hired over the next five years. The anticipated cost requires a total of $2.1 million in continuing resources for the new hires (approximately $5.5 million in cash over that time frame). Since the College also has to finance startup and retention packages for faculty members who have already accepted offers to begin or continue their career at Ohio State, this additional annual rate will help produce on average $2.1 million per year to finance current commitments and projected startup costs over the next four years.

Auxiliary Faculty –
This year the College's commitment to part-time faculty is approximately $3.7 million for salaries and benefits. Through 2013, the College will maintain this level of funding in this category of faculty, without adding incremental resources, as a cost containment strategy. However, these resources will be reallocated to replace short-term lecturers with individuals who have a long-term commitment to undergraduate education.

Staff -
Assuming annual salary and benefit increases of 3.5% per year, and the attrition plan that is described below, MPS will invest over $1.4 million in incremental continuing resources in its staff through 2013. The College currently has 197 FTE staff members and this cost will be contained by staff attrition. While it is impossible to predict attrition with any certainty, the College will seek to reduce the level of staff financed by the general fund through this time period by 8 FTE, for a projected savings of $640,000 in continuing resources.

The College is committed to maintaining quality services, improving internal controls and maintaining appropriate separation of duties while absorbing this modest level of attrition. Departments will be encouraged to find other ways to finance the staff levels they deem necessary, whether through sponsored grants or by setting market-based charges for the services provided by shops. In addition, as the IDCs are decentralized to the departments, one legitimate use for these resources is to maintain or increase the research support staff provided to faculty, insofar as the departmental leadership is prepared to reduce these services should an unexpected drop in IDCs occur.

Graduate Assistants -
According to University Profiles data, the college currently employs 241 FTE Graduate Assistants (GAs), which translates into approximately 482 students. This is approximately 17 FTE (or 34 students) more GAs than the base year of 2002. However, since 2002 the college has not noticeably added to the annual rate backing either the stipends or fee authorization expenses of the additional GTAs. Thus, the college anticipates reducing the GA staff by 36 students over the next four years, or approximately back to the 2002 level. Along with this cost containment effort, the college anticipates a

net savings in fee authorization costs of $450,000 in continuing resources after factoring in the rule change of a post-candidacy doctoral student being required to register for only 3 credit hours to be considered a full-time student. However, these savings could be offset by reduced teaching that could occur in the Department of Statistics if academic advisors discourage graduate students from taking additional courses in statistics.

Even with these cost reductions, the college will invest net resources of $2.6 million in incremental continuing funds over the next four years to fully fund the desired level of GA's, increase stipends 3.5% per year and offset anticipated 5% annual tuition increases.

Other Personnel Costs –
As a part of the FY09 budget process, the College will carefully examine with the units other personnel costs to ensure these resources are being used in alignment with this strategic plan. This year, it is estimated the college is supporting nearly $2 million in costs for student employees, supplemental compensation, additional pay, staff awards and Quarter-Off-Duty (QOD) for Chairs, Vice Chairs and other faculty members. It is possible that a portion of this budget may be redirected to other areas that are of greater strategic importance and may offset planned decreases in other areas. At a minimum, no additional incremental resources will be dedicated toward this category.

Supplies & Services –
The College will spend nearly $4.8 million in supplies and services, however only $3.7 million in annual rate currently backs these expenditures. Thus, to just maintain this level of expenditure the College must invest a little over $300,000 in incremental annual resources in its supplies and services budget over the next four years. With a rate of overall inflation around 4% nationally, maintaining current expenditure levels will in effect create a budget cut since the overall purchasing power of those dollars will be reduced. Thus, the College will carefully examine with the departments the general supplies and services budgets to ensure these resources are being used in alignment with this strategic plan, and look for efficiencies.

Equipment –
General fund equipment purchases that are not associated with faculty start-up agreements will be reduced 2% per year through 2013. This cost-containment effort should produce ~$62,000 in incremental annual savings. Departments may choose to offset these budget decreases for equipment expenditures that are a part of their general funds support of research efforts with the IDC resources that are slated to be decentralized.

Other Continuing Costs
There are several major continuing College commitments to other university units or institutions outside of Ohio that are currently backed by continuing funds generated by marginal IDCs from previous years. The College leadership fully intends to keep these commitments.. They are $760,000 for MOUs with other colleges (Byrd Polar Research Center, Institute for Materials Research, Life Sciences IGPs, etc.), and $440,000 for the College's support of the Mathematical and Biological Sciences Institute (MBI). However, the College still needs to eventually set aside slightly over $1.3 million in annual rate for the operating costs of the Large Binocular Telescope by 2014 (please note that the rest of the annual payment was built into the operating budget of the Astronomy Department by a prior administration)

Other Potential Cost Containment Strategies –
The Van De Graaff building on West Campus was slated to house a laser research laboratory. However, that operation was located in the Physics Research Building upon completion. The College has no other use for this building. If FOD could find another willing occupant or if the building could be demolished, the College would save $142,000 in continuing resources (figure based on the FY07 square footage rate) by removing this building from its space inventory. These options will be pursued over the next year so this small adjustment may be made to the bottom line.

e. Bottom Line
Overall, the college anticipates generating $12.5 million in new incremental PBA resources from 2009 through 2013 and an additional $2.6 million in one-time cash. The College plans to invest $10.1 million primarily in its human resources and financing continuing costs that are not currently financed by annual rate.

From a cash perspective, the College, OAA and Arts and Sciences are committed to bringing the MPS debt to zero by the end of 2013 as previously discussed. The annual rate plan described above will move the College towards this goal. However, this means that annual deficits will continue to grow in FY09. The table below shows the projected cash flow for FY09 through FY13. As demonstrated in Table 9, this will allow MPS to contribute more than $11 million towards its $23 million debt

Table 9
Projected General Funds Cash Sources and Uses Through 2013

Dollars in Thousands	FY09	FY10	FY11	FY12	FY13
Total Projected General Fund Sources	$ 75,576	$ 79,509	$ 82,888	$ 87,596	$ 90,063
Total Projected General Fund Uses	$ 77,597	$ 77,316	$ 78,034	$ 79,386	$ 81,325
Net Operating Margin	**$ (2,021)**	**$ 2,193**	**$ 4,854**	**$ 8,209**	**$ 8,738**
College Deficit	**$ (22,771)**	**$ (20,578)**	**$ (15,724)**	**$ (7,515)**	**$ 1,223**

f. Strategic Priorities: Revenue and Expenses
i. TIE

The TIE directors have submitted their annual reports to OAA and have received their reviews. Responses to these reviews have been submitted and accepted by OAA and OR.

ii. Unit Initiatives
Each unit plan was more fully developed in the Section 4, Department Goals and Performance Metrics.

Astronomy
The first Jefferson Chair holder is a distinguished faculty member, Professor Andrew Gould, internal to the Department of Astronomy. In four years we will conduct an external search for the second Jefferson Chair holder who will be a faculty member in Astronomy or Physics or both departments. After the CCAPP TIE funding ends in FY2012, MPS will provide 100k/year in post-doctoral

fellowships for five years. Astronomy will remain part of the LBT project and the ISL will complete construction of the MODS component of the LBT. When this project is complete astronomy will support one third of ISL personnel on grants and phase-in devoting its IDC returns to support the ISL. Astronomy will seek to name the ISL and use the interest on naming rights to support the laboratory. The development focus in Astronomy will be on endowed chairs, in addition to support of the LBT project.

Chemistry
The Department of Chemistry will recruit six new faculty members over the next five years, not counting an ORSP hire. Depending on the attrition rate this level of recruiting may increase in years 3 or 4 of this plan. In the short term this will be financed by course redesign and a reduction in the number of TA's. In the long term committing to start-up costs will be contingent upon increases in the IDC/faculty ratio. Chemistry will be recruiting an ORSP faculty member in synthetic organic chemistry. The Evans Laboratory project is the top capital/development project of the college. Chemistry will also institute laboratory fees in recognition of the high cost of instruction in this unit.

Earth Sciences
The School of Earth Sciences will conduct an OAA TIE funded search leading to a faculty hire in FY 2010, and consider and compete for a second OAA financed TIE hire in 2011 and, if realized, a third MPS, TIE matching hire in 2014. The SES will use ORSP funding to recruit a faculty member in carbon sequestration. Newly endowed chairs in SES will be a development priority. FOD has selected Orton Hall for consideration for renovation. We also plan to develop a fundraising plan to renovate Mendenhall Lab. SES will fund growth in its research staff by reallocation and IDC increases and release time.

Mathematics
The Department of Mathematics will use the Saltzer Chair and the Alice Woods Professorship to recruit or retain two distinguished senior mathematicians over the next five years and search for junior mathematicians in areas depleted by faculty attrition, including those ranked by USNWR. Sufficient junior mathematicians will be recruited each year to lead to a net increase of approximately seven faculty members over the next 5 years. There are 3 more MBI-TIE positions to be filled and mathematics will continue to partner with the Comprehensive Cancer Center to recruit mathematicians in this area. Mathematics is proposing course redesign, as detailed in Section 5, and to partner with several colleges to develop new master's degree programs. As the new master's degree programs grow mathematics will reduce the size of its doctoral programs from 130 to 80 students.

Physics
In addition to the initiatives with Astronomy described above, physics will hire two faculty members aligned with the CCAPP and ENCOMM TIE initiatives over the next 5 years. The CCAPP-related hire will be the first. Start-up costs of new faculty will be financed by the growth of IDC/faculty member. The college, the department and FOD must redouble their efforts to make the PRB fully functional and allow all of the research it was designed to accommodate. Physics will also institute laboratory fees in recognition of the high cost of instruction in this unit. Physics will fund growth in research staff by reallocation.

Statistics

The Department of Statistics will hire an assistant professor in 2011 and then recruit faculty at a replacement level or at a greater level as they can be "earned" by increased SCRs. General funds will be set aside to build up a war chest for the Cockins Hall renovation and this will be augmented by development activity.

iii. Metrics for Individual Units

Metrics to be used in every doctoral program will include the six-year completion rate, the ratio of RAs to TAs, the average time to graduation, and research expenditures per faculty member. We will benchmark against appropriate peers, which may vary from unit to unit. Metrics for the undergraduate program will include the number of majors, the number of students doing undergraduate research and the first to second year retention rate of students in chemistry, physics, and mathematics. More details are provided for each unit in section 4.

Appendix 1: SWOT Analysis

Strengths

The College of MPS has a world-class faculty which compares favorably with every other college at The Ohio State University.

MPS faculty are world-renowned for their research on global climate change.

Ohio State is part of the consortium building the LBT, which, upon completion in 2012, will give our faculty and students access to the most advanced optical telescope in the world.

The Department of Physics and the fields of algebra/number theory/algebraic geometry, condensed matter physics, cosmology/relativity/gravity, discrete mathematics and combinatorics, nuclear physics, and paleontology have in recent years been ranked in the Top 25 by U.S. News and World Report (USNWR.) The disciplines of astronomy and statistics are not evaluated by USNWR. We are confident that these two units will be rated as top 20 departments in the coming NRC review.

Through winter quarter 2008, undergraduate credit hours of instruction are up 3% over the previous year as compared to a 1.8% increase for the total university. IDC recovery has increased by 14.6% relative to the previous year.

Weaknesses

The condition of Cockins Hall, Mendenhall Laboratory, Evans Laboratory, Johnston Laboratory, and Orton Hall hurts our ability to recruit and retain high quality faculty and so must be considered a weakness. Renovating and replacing these buildings is a high priority as discussed in section 8. The Physics Research Building is stunningly beautiful but is still not able to support all of the modern research it was designed to accommodate.

The lack of gender diversity and the small number of underrepresented minority group members, particularly in the ranks of senior faculty, endowed chair holders, and unit and college leadership positions is another weakness.

In too many MPS units, the IDC/faculty ratio is well below either Big Ten public or Trustees benchmarks.

The competition between units for college resources and the historic lack of transparency and clear strategic principles guiding the internal distribution of college resources have led to much bitterness, frustration, and confusion among the faculty and staff. Chairs, directors and faculty have had insufficient training, information, and incentive to understand and manage their budgets. Changing the culture via improved communication, transparency, and incentives is a key goal. Given the rivalry between MPS units and the less than optimal synergies between them, the college must submit very different strategies for each unit as described in the appendices.

Opportunities
MPS has received more TIE support than any other college. The TIEs are nicely aligned with our strengths in many cases. The Advanced Materials TIE supports our strong program in condensed matter while the Center for Cosmology and Astro-Particle Physics TIE supports our Top 25 program in Cosmology. The Climate, Water and Carbon (CWC) TIE supports our world-renowned program in climate change and the Mathematical Biology TIE supports our unique NSF center and positions Ohio State to be the emerging leader in this field.

Emerging within MPS and CBS is a core group of interdisciplinary faculty working at the interface of biology, chemistry, mathematics, medicine and statistics. MPS and CBS will want to strengthen this effort. It is time to integrate our strengths in biophysical chemistry, RNA chemistry/biology and biophysics with the Mathematical Biology Institute.

Energy and the Environment are key themes of the Department of Chemistry and the School of Earth Sciences and the CWC TIE and the OSU Institute of Energy and the Environment. Subsequent to submission of the April SP, MPS learned it had been awarded an ORSP in Carbon Sequestration which will be matched by an energy related position in Chemistry. A second ORSP Chemistry position in the area of synthesis may overlap nicely with the Translational Plant Science TIE. This is another area of potential investment.

MPS is delighted by the award of an NSF MSEC. The MRSEC funding is a direct result of TIE investment in Advanced Materials (ENCOMM). MPS strength in ENCOMM is largely based in Physics. It is time to strengthen the field of materials within the Chemistry Department to maintain the ENCOMM/MRSEC momentum. Joint faculty hires in Chemistry and Physics can be envisaged.

The availability of Choose Ohio First Scholarships for STEM students presents MPS with a once in a generation challenge to increase the number of MPS majors, engineers, and life science students. Increased enrollments will bring many challenges along with increased revenue and a challenge to improve our first-to-second year retention rates.

Threats
There are nine faculty members in the School of Earth Sciences, 15 in the Department of Mathematics, and 12.43 FTE in the Department of Physics (see the Appendix) that are over 60 years of age.

In SES, there are four individuals with at least 30 years of STRS credit, in Mathematics there are ten such individuals, physics has four and chemistry four. Over the past six years the college lost, on average, 11 faculty/year in retirements and resignations with a maximum of 15 and a minimum of six in any particular year. While it is impossible to predict human behavior, the college estimates that it will continue to lose ~10 faculty/year. This is viewed as a threat, particularly in SES, physics, and mathematics, but also as an opportunity to redirect resources. The college will review and monitor its strategic plan on an annual basis. If retirements and resignations vary greatly from projections we will, of course, modify our tactics.

The size of the mathematics faculty is at a 40 year low and is down by roughly a third from its peak value. The average faculty member in mathematics is 26 years from degree and, as just mentioned, it is reasonable to expect further erosion in the near future due to retirements. The size of the chemistry

faculty is near a 25 year low. Chemistry had an NRC ranking of 16 in 1982 and of 22 in 1992. In 2007, the graduate program in chemistry was 28th in the USNWR rankings and we expect a corresponding slippage in the upcoming NRC rankings. This reflects not simply a loss of faculty but the loss of numerous *high-profile* faculty.

Mathematics was 29th in the 1992 NRC rankings but this position will be difficult to maintain due to the shrinkage in faculty size it has already experienced and the many retirements we expect. Chemistry and mathematics are responsible for nearly two-thirds of the undergraduate student credit hours (SCR) taught by MPS and therefore provide nearly half of the revenue that flows into the college. Continued decreases in the quantity and quality of the faculty in these departments will make it increasingly difficult to attract quality graduate students to these departments. As graduate students in these departments are a crucial component of our undergraduate instructional staff, and will be even after course redesign, declines in the quality and quantity of doctoral students not only adversely influences the reputation of these doctoral programs but places at risk our ability to recruit and deliver high quality undergraduate instruction to STEM students. Chemistry and mathematics are proposing new ways of delivering instruction that will use their TAs more efficiently and effectively. Nevertheless, the possibility that the reputations of these two doctoral programs may fall dramatically is the greatest threat to the College of MPS and arguably to the many aspirations of The Ohio State University. Preventing such a catastrophe must be the highest strategic priority of the college.

The new General Education Curriculum (GEC) is perceived to be a threat, but it also presents opportunities. The vast majority of our GEC credit hours are from mathematics, statistics, and service courses in chemistry and physics that are required in major programs in the biological sciences and engineering, and the credit hours from these offerings will be essentially unaffected by the new GEC. By contrast, the Department of Astronomy and the School of Earth Sciences offer GEC courses that are largely taken by Bachelor of Arts students in the humanities and social sciences. Under the new GEC requirements in the Natural Science Breadth Category, the number of required science coursed for BA students has been reduced from four to three, which will therefore likely disproportionately impact Astronomy and Earth Sciences enrollments. However, this is also an opportunity for creating interesting courses with appeal for the non-science student. Both of these units have either recently been approved or are in the approval process for courses that specifically meet the needs of the new GEC. But, in addition to competing for students within the basic requirements, the new GEC allows students to pick additional breadth courses in a flexible way, opening the way for us to increase enrollments through the appeal of these new courses, It will be several quarters before we begin to see the net effect of the changes. We will monitor the enrollments and our units will continue to think creatively about curricular offerings with broad appeal.

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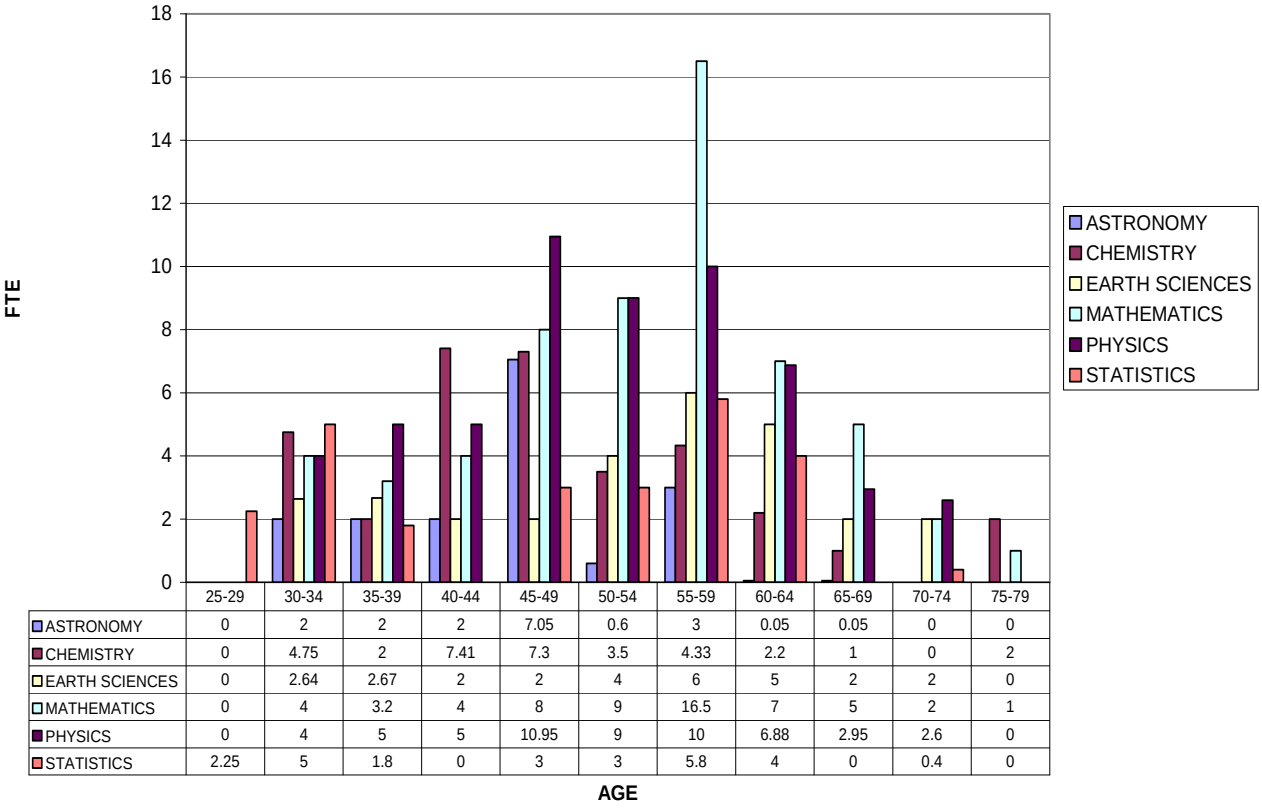
220.88 FTE
FEBRUARY 25,2008



	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
ASTRONOMY	0	2	2	2	7.05	0.6	3	0.05	0.05	0	0
CHEMISTRY	0	4.75	2	7.41	7.3	3.5	4.33	2.2	1	0	2
EARTH SCIENCES	0	2.64	2.67	2	2	4	6	5	2	2	0
MATHEMATICS	0	4	3.2	4	8	9	16.5	7	5	2	1
PHYSICS	0	4	5	5	10.95	9	10	6.88	2.95	2.6	0
STATISTICS	2.25	5	1.8	0	3	3	5.8	4	0	0.4	0

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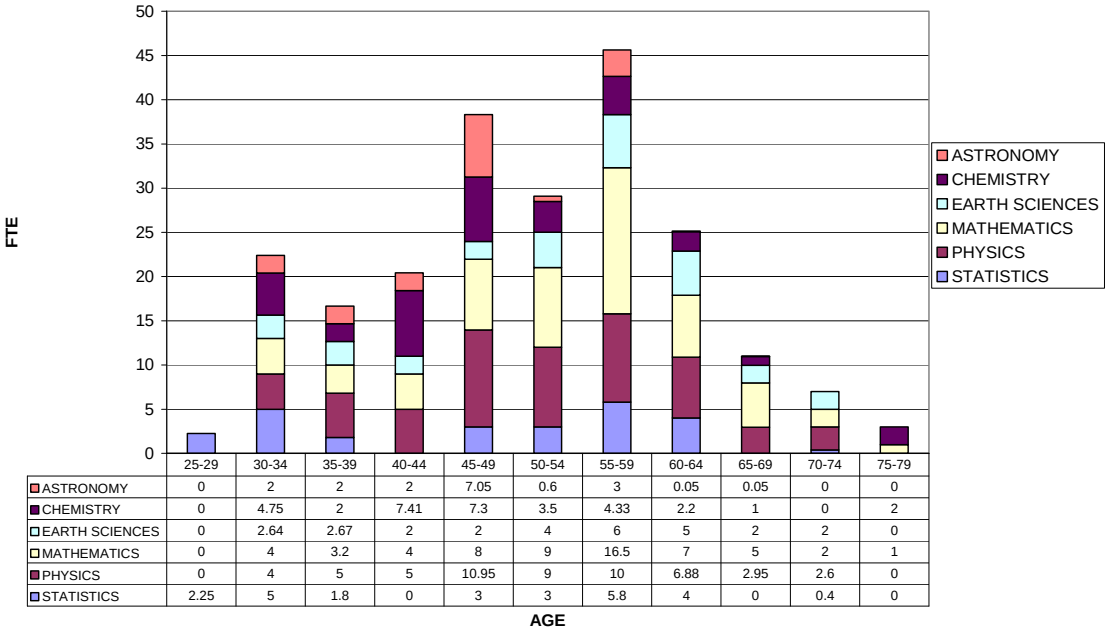

	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
ASTRONOMY	0	2	2	2	7.05	0.6	3	0.05	0.05	0	0
CHEMISTRY	0	4.75	2	7.41	7.3	3.5	4.33	2.2	1	0	2
EARTH SCIENCES	0	2.64	2.67	2	2	4	6	5	2	2	0
MATHEMATICS	0	4	3.2	4	8	9	16.5	7	5	2	1
PHYSICS	0	4	5	5	10.95	9	10	6.88	2.95	2.6	0
STATISTICS	2.25	5	1.8	0	3	3	5.8	4	0	0.4	0

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Appendix 3
List of Approved Centers

Byrd Polar Institute --- Office of Research creation; involves faculty from School of Earth Science.

Center for Cosmology and AstroParticle Physics (CCAP) --- created by TIE; center involves faculty from the Astronomy and Physics departments.

Institute for Materials Research (IMR) --- funded by Materials TIE, OR, and the MPS and COE colleges; involves faculty from Chemistry and Physics.

Institute for Energy and the Environment (IEE) --- formed this year; funded by TIE, OR, MPS, and COE, plus recent ORSP award from state of Ohio; will involve faculty in the department of Chemistry and School of Earth Science.

Mathematical Biosciences Institute (MBI) --- originally created from a large block grant from the NSF, now also funded by TIE source and MPS; involves faculty in the Mathematics and Statistics departments.