DEPARTMENT OF MATHEMATICS, STATISTICS, AND PHYSICS

2015 SELF-STUDY REPORT

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WICHITA STATE UNIVERSITY

Program Review Self-Study Template

Academic unit: Mathematics, Statistics, and Physics

College: LAS

Date of last review 2012

Date of last accreditation report (if relevant) ____________

List all degrees described in this report (add lines as necessary)

Degree: BS Mathematics CIP* code: ______________

Degree: BS Physics CIP* code: ______________

Degree: MS Mathematics CIP code: ______________

Degree: PhD Mathematics CIP code: ______________

*To look up, go to: Classification of Instructional Programs Website, http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55

Faculty of the academic unit (add lines as necessary)

Name *** * Faculty signatures are on file in the department.**

Mark Arrasmith - Instructor/Unclass Prof.

Elizabeth Behrman - Professor

Stephen Brady – Assoc. Professor

Alexander Bukhgeym – Professor

Dharam Chopra – Professor

Casey Craig – Instructor

Tinka Davis – Instructor

Thomas DeLillo – Professor

Jason Ferguson – Professor

Buma Fridman – Professor

Matthew Gray – Instructor

Hussein Hamdeh – Professor

John Hammond – Instructor

Lop-Hing Ho – Assoc. Professor

Xiaomi Hu – Professor

Leo Huelskamp – Instructor

William Ingle – Instructor/Unclass Prof.

Victor Isakov – Professor

Thalia Jeffres – Assoc. Professor

Zhiren Jin – Professor

Buddy Johns – Assoc. Professor

Kirk Lancaster – Professor

Foudil Latioui – Instructor

Tianshi Lu – Assoc. Professor

Chunsheng Ma – Professor

Daowei Ma – Professor

Holger Meyer – Assoc. Professor

Kenneth Miller – Professor

Mathew Muether – Asst. Professor

Hari Mukerjee – Professor

Phillip Parker – Professor

Sandra Peer – Instructor/Unclass Prof.

Rachel Safarik – Instructor

Paul Scheuerman – Instructor/Unclass Prof.

Catherine Searle – Asst. Professor

Nickolas Solomey – Professor

Summer Steenberg – Instructor

Ziqi Sun – Professor

Syed Taher – Assoc. Professor

Richard Traverzo – Instructor

Mark Walsh – Asst. Professor

Submitted by: Buma Fridman, Professor & Chair Date 04/01/2015
(name and title)

Submitted by: Thomas DeLillo, Professor & Interim Chair Date 04/01/2015
(name and title)

Submitted by: Kirk Lancaster, Graduate Coordinator Date 04/01/2015
(name and title)

1. Departmental purpose and relationship to the University mission (refer to instructions in the WSU Program Review document for more information on completing this section).

a. University Mission:

The mission of Wichita State University is to be an essential educational, cultural, and economic driver for Kansas and the greater public good.

b. Program Mission (if more than one program, list each mission):

The mission of the undergraduate program in Mathematics and Statistics is to provide a broadly based program in undergraduate level mathematics and statistics which will prepare students for either graduate study in mathematics and statistics or for mathematics-statistics related employment in academic, industrial or governmental positions. The undergraduate program is committed to providing the mathematical instruction needed by programs in business, education, engineering and health professions, as well as in the liberal arts and sciences.

The mission of the undergraduate program in Physics is to provide a broadly based, flexible program in undergraduate level physics which will prepare students for graduate study in physics or a related discipline or for physics-related employment in academic, industrial, or governmental positions. The undergraduate program is also committed to providing the physics instruction needed by programs in other sciences, engineering, education, and health professions, as well as in the liberal arts.

The mission of the M.S. program in Mathematics is to provide a broadly based, flexible program in graduate level mathematics and statistics which will prepare students for either doctoral study in mathematics and statistics; or for mathematics-statistics related employment in academic, industrial or governmental positions.

The mission of the Ph.D. program in Applied Mathematics is to provide a high quality doctoral program in applied mathematics that will prepare students to become research mathematicians in either academia, business or industry.

c. The role of the program (s) and relationship to the University mission: Explain in 1-2 concise paragraphs.

Our department supports the university's educational commitment to the state and community by providing instruction in mathematics and statistics at all levels from pre-college mathematics through doctoral study. The need for mathematics permeates the modern technological world and workplace. Because the extent of mathematical training and expertise required varies considerably according to profession, the department provides instruction for students with a wide variety of goals and at all levels from the baccalaureate to the doctoral.

Physics is the root of all sciences and engineering. Without a broad educational base in Physics, programs in other sciences and in engineering would not have the solid foundation they need, nor would local industry be provided with the leadership necessary in diverse groups of scientists and engineers.

Both baccalaureate programs and the Master’s program are broadly based programs designed to prepare students for · employment in any of a wide variety of mathematics, statistics and physics based careers in science, industry and government, as well as other careers in which logical problem solving skills and precise thinking are valuable; teaching careers at the middle school, high school, junior college or college level; further study in mathematics, statistics or physics at a more advanced level.

Wichita State University is committed to providing comprehensive educational opportunities in an urban setting. Through teaching, scholarship and public service the University seeks to equip both students and the larger community with the educational and cultural tools they need to thrive in a complex world, and to achieve both individual responsibility in their own lives and effective citizenship in the local, national and global community.

The Ph.D. program in applied mathematics was developed specifically to support the state's growing technology-dependent industries. It contributes to and will continue to contribute to the economic development of the state, and the Wichita metropolitan area in particular. The Ph.D. program aims directly at building and upgrading the mathematical resources needed to sustain the technological base of the state. It is designed to provide substantive expertise in areas that are vital to industry in order to promote effective competition in commercial, governmental and international markets.

The graduate faculty in the department contributes significantly to the university's research mission. As reported in ScienceWatch.com on May 31, 2009, WSU ranks in the top 5 universities nationwide in the contribution of mathematics toward the university's total research productivity. Effective classroom teaching and continuing research activity by the faculty are equally important for the well-being and vitality of the programs offered by the department. Through their professional expertise, members of the faculty also provide service to the academic community as well as the industrial and commercial communities within the state.

d. Has the mission of the Program (s) changed since last review? [ ] Yes [X] No

e. Provide an overall description of your program (s) including a list of the measurable goals and objectives of the program (s) (both programmatic and learner centered). Have they changed since the last review?

[ ] Yes [X] No

The objectives of the undergraduate program in Mathematics and Statistics are:

- to provide students with a solid foundation in the major areas of mathematics and statistics and an understanding of the role of mathematics and statistics in applications;
- to prepare its graduates for either graduate study in mathematics and statistics, or for careers in teaching at the high school level or in any of a wide variety of mathematics and statistics based careers in science, industry and government, as well as other careers in which logical problem solving skills and precise thinking are valuable.

The objectives of the undergraduate program in Physics are:

- to provide a broadly based, flexible program in undergraduate level physics;
- to prepare its graduates for graduate study in physics or a related discipline or for physics-related employment in academic, industrial, or governmental positions.

The objectives of the MS program in Mathematics are:

- to provide students with a program of study in which they build on the knowledge acquired in an undergraduate program in mathematics and statistics by taking more advanced course work (and optional thesis work) in certain areas of mathematics and/or statistics;
- to prepare its graduates for either further study in mathematics and statistics at the PhD level, a career in teaching at the high school or junior college level, a career in science, industry or government that requires graduate level training in mathematics or statistics.

The objectives of the PhD program in Applied Mathematics are:

- to enable students to reach the forefront of knowledge in some area of applied mathematics and to expand knowledge in this area through original research while also acquiring a broad grasp of the current state of the field;
- to prepare its graduates for either an academic career in teaching at the college or university level or a non-academic research career as an applied mathematician, statistician or scientist.

For each program, the first of the above stated goals is assessed in terms of specific learning outcomes in Section 3c of this Self-Study. A summary analysis of the results of these assessment activities is that all targets were met in at least two of the three years, and almost all were met in every year.

Assessment of the second goal for each program is provided in Section 4. The MS program expects at least 85% of the graduates of the program to obtain mathematics-statistics related employment or admission to a doctoral program within one year of graduation. Also, at least 85% of the graduates of the Ph.D. program are expected to obtain mathematics, statistics or physics related employment within one year of graduation. The data presented in tables 4c and 4d indicate that these targets have been exceeded each year.

The Physics program has been growing steadily since 2008, has doubled over the three years of this study, and now attracts 12-15 new majors per year. We actively recruit new majors from area high schools and community colleges, and have instituted a new joint double major across colleges with the Engineering College which is very successful. During this review period the physics group has resumed teaching all of the first year calculus-based physics courses for engineering students. This transition was done smoothly, but may require additional instructional and lab support as enrollments grow.

2. Describe the quality of the program as assessed by the strengths, productivity, and qualifications of the faculty in terms of SCH, majors, graduates and scholarly productivity (refer to instructions in the WSU Program Review document for more information on completing this section). Complete a separate table for each program if appropriate.

Complete the table below and utilize data tables 1-7 provided by the Office of Planning Analysis (covering SCH by FY and fall census day, instructional faculty; instructional FTE employed; program majors; and degree production).

Scholarly Productivity	Number Journal Articles		Number Presentations		Number Conference Proceedings		Performances			Number of Exhibits		Creative Work		No. Books	No. Book Chaps.	No. Grants Awarded or Submitted	$ Grant Value
	Ref	Non-Ref	Ref	Non-Ref	Ref	Non-Ref	*	**	***	Juried	****	Juried	Non-Juried				
Year 1 2012	32		22		6											7	$409,511
Year 2 2013	25		11		5											8	$445,483
Year 3 2014	22		11		7											7	$214,838

* Winning by competitive audition. **Professional attainment (e.g., commercial recording). ***Principal role in a performance. ****Commissioned or included in a collection.

Provide a brief assessment of the quality of the faculty/staff using the data from the table above and tables 1-7 from the Office of Planning Analysis as well as any additional relevant data. Programs should comment on details in regard to productivity of the faculty (i.e., some departments may have a few faculty producing the majority of the scholarship), efforts to recruit/retain faculty, departmental succession plans, course evaluation data, etc.

Provide assessment here:

In the Fall 2014 the MSP department had 28 tenure eligible faculty. All of them hold a Ph.D. degree, twenty six (92 %) had graduate faculty status. All of our graduate courses are taught by full-time, tenure-track faculty.

The strengths of the graduate faculty consist of (i) research concentrations in areas related to the Ph.D. program in Applied Mathematics, (ii) recognized expertise in research and (iii) graduate instruction, training and mentorship.

(i) Faculty research areas include Analysis (partial differential equations, several complex variables, and calculus of variations), Differential Geometry and Mathematical Physics (pseudo-Riemannian manifolds, geometric flows, smooth topology), Numerical Analysis (numerical conformal mapping, computational fluid dynamics), Combinatorics and Statistics (spatio-temporal statistics, statistical computing, experimental design, mathematical statistics, and statistical procedures under constraints). Research interests such as inverse problems, integral geometry, free boundary problems, partial differential equations, probability and statistics overlap specific areas of Applied Mathematics with applications to the following areas:

1) Tomography and Integral Geometry. Applications to geophysics and medicine (three dimensional pictures of internal organs of a human body by CAT and MRI scans).
2) Determining obstacles and boundary conditions from scattering type data (in particular looking for size and location of cracks, say, in aging aircraft).
3) Fluid mechanics. Discovery of different physical phenomena (vorticity and turbulence, for example) through the use of the appropriate mathematical models.

4) Numerical Analysis. Solving of applied problems in various areas, such as fluid dynamics or mathematical physics, by using high speed computers.
5) Carleman estimates and uniqueness and stability of the continuation for partial differential equations and related numerical algorithms (for example, determination of vibrations of surfaces from remote acoustical measurements).
6) Survival Analysis.
7) High energy physics, astrophysics, quantum information, and materials science.
8) Smooth Geometry and Topology (for example, investigating the Hopf Conjecture, Morse functions, surgery on manifolds).

Our concentrations in partial differential equations (9 graduate faculty), geometry and topology (6 graduate faculty) and probability and statistics (4 graduate faculty) together with faculty research in several complex variables (3 graduate faculty) and numerical analysis (3 graduate faculty) allow our graduate students to obtain multiple perspectives of major areas of applied mathematics and statistics and to learn a large variety of complementary mathematical, computational and statistical techniques which will assist them in their careers.

(ii) Faculty research expertise is illustrated in many different ways:
In 2006, Victor Isakov was awarded the rank of Distinguished Professor of Mathematics. It was the first time in the (more than 100 years of) history of our department that our faculty member received such an award. We believe that this award, as well as many awards and recognitions our faculty have received year-after-year in the past 10-15 years, speaks to the quality of fundamental and applied research our department is involved in. Alan Elcrat (2000) and Victor Isakov (2001) won the WSU Excellence in Research Award. Chunsheng Ma (2005) and Christian Wolf (2007) won the WSU Young Faculty Scholar Award.

Over the past three years one faculty has been promoted to Associate Professor, two to Full Professor, three successfully underwent Professor Incentive review.

External experts have written about Mathematics & Statistics & Physics faculty in different contexts. One remark is in order. Starting 2010 we introduced the blind external evaluation for faculty applying for tenure and/or promotion. Due to confidentiality concerns we cannot exhibit these highly positive evaluation letters here. The same is true for other review letters talking of the research accomplishments of our faculty. So, we decided to include in Attachment #2 some of the previous (in years 2000-2010) letters characterizing the work of our existing faculty. So, a sample of letters from faculty at the University of Washington, University of Illinois, Oxford University, Stanford University, Rutgers University, and one Review for the Kansas NSF EPSCoR Award, and are included in Attachment #2.

Mathematics, Statistics, and Physics faculty serve on editorial boards of academic research journals. Since the Ph.D. program in Applied Mathematics was initiated in 1985, faculty have received grants from well-known and highly competitive federal, state and local agencies such as the National Science Foundation, Department of Defense, Department of Energy, Air Force, Federal Aviation Administration, National Research Council, National Geospatial-Intelligence Agency, and The Kansas Health Foundation.

Mathematics & Statistics faculty have given invited addresses at conferences and institutions throughout the world.

3. Academic Program: Analyze the quality of the program as assessed by its curriculum and impact on students. Complete this section for each program (if more than one). Attach updated program assessment plan (s) as an appendix (refer to instructions in the WSU Program Review document for more information).

a. For undergraduate programs, compare ACT scores of the majors with the University as a whole.

The mean ACT scores for students in Mathematics and Statistics and for students in Physics are significantly higher than the mean ACT scores for students in all university undergraduate programs. Undergraduate students in MSP programs are well prepared for success.

b. For graduate programs, compare graduate GPAs of the majors with University graduate GPAs.*

The mean application GPA of graduate students admitted to MSP graduate programs, 3.6, exceeds the mean GPA of all admitted graduate students, 3.5. Graduate students entering a MSP graduate program are well prepared for graduate studies. The mean GPA of students admitted to the PhD program in Applied Mathematics (FY2012: 3.63; FY2013: 3.89; FY2014: 3.83) exceeded those for the college and university in FY2013 and FY2014; the mean GPA scores of students admitted to LAS PhD programs were FY2012: 3.70; FY2013: 3.70; FY2014: 3.73 and the mean GPA scores of students admitted to WSU PhD programs were FY2012: 3.66; FY2013: 3.68; FY2014: 3.67.

c. Identify the principal learning outcomes (i.e., what skills does your Program expect students to graduate with). Provide aggregate data on how students are meeting those outcomes. Data should relate to the goals and objectives of the program as listed in 1e. Provide an analysis and evaluation of the data by learner outcome with proposed actions based on the results.

In the following table provide program level information. You may add an appendix to provide more explanation/details. Definitions:
Learning Outcomes: Learning outcomes are statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program (e.g., graduates will demonstrate advanced writing ability).
Assessment Tool: One or more tools to identify, collect, and prepare data to evaluate the achievement of learning outcomes (e.g., a writing project evaluated by a rubric).
Criterion/Target: Percentage of program students expected to achieve the desired outcome for demonstrating program effectiveness (e.g., 90% of the students will demonstrate satisfactory performance on a writing project).
Result: Actual achievement on each learning outcome measurement (e.g., 95%).
Analysis: Determines the extent to which learning outcomes are being achieved and leads to decisions and actions to improve the program. The analysis and evaluation should align with specific learning outcome and consider whether the measurement and/or criteria/target remain a valid indicator of the learning outcome as well as whether the learning outcomes need to be revised.

NOTE: For BS Mathematics, two assessment tables are provided following this page. The first table gives the assessment data from 2010-2013, during which time our assessment on BS Mathematics program was based on the old assessment plan (See attachment). Under the old assessment plan, data was collected and assessed on a calendar year basis. Each year, one learning outcome was assessed. Thus we provide all available results from Calendar year 2010-13 instead of Fiscal year 2012-2013. Since the spring of 2014, we adapted a new assessment plan for the BS Mathematics program (See attachment). The second table (for Fiscal Year 2014) shows assessment data and result from Spring 2014. Assessment data and results from Summer 2014 and Fall 2014 are available upon request, which will be included in the assessment result for FY15.

BS Mathematics –2010-2013 (Based on the Old Assessment Plan, See attachment)

Learning Outcomes (most program will have multiple outcomes)	**Assessment Tool (e.g., portfolios, rubrics, exam)**	**Target/Criteria (desired program Level achievement)**	**Results**	**Analysis**
Students acquire understanding of mathematical reasoning and the advanced calculus. Related to outcome goal 1, 2, 3, and 4	Grades of assessment oriented final exams of Math 415 & 547, the consultant's report, and the grades assigned by the consultant.	70% of students who take Math 415 have grade of C or better. Good consultant's report and grades B or better.	2010: 95% of 75 students enrolled have grade C or better. Excellent Consultant Report. Consultant's grades: A, A, A	Target exceeded.
Students acquire adequate understanding of numerical methods. Related to outcome goal 3.	Grades of assessment oriented final exam of Math 551, the consultant's report, and the grades assigned by the consultant.	70% of students who take Math 551 have grade of C or better. Good consultant's report and grades B or better.	2011: 96% of 22 students enrolled have grade C or better. Excellent Consultant Report. Consultant's grades: A, A, A	Target exceeded.
Students acquire adequate understanding of ordinary differential equations. Related to outcome goal 2, 3, 4.	Grades of assessment oriented final exam of Math 555, the consultant's report, and the grades assigned by the consultant.	70% of students who take Math 555 have grade of C or better. Good consultant's report and grades B or better.	2013: 87% of 236 students enrolled have grade C or better. Excellent Consultant Report. Consultant's grades: A, A, A	Target exceeded.
Students acquire knowledge of diverse statistical techniques. Related to outcome goal 4 and 5	Grades of assessment oriented final exam of Stat 571, the consultant's report, and the grades assigned by the consultant.	70% of students who take Stat 571 have grade of C or better. Good consultant's report and grades B or better.	2012: 100% of 15 students enrolled have grade C or better. Excellent consultant Report. Consultant's grades: A, A, A	Target exceeded

Outcome Goals: (1) Students majoring in mathematics should possess a common core of mathematical skills, leading to a better understanding of mathematical reasoning. (2) Students who wish to do graduate work in mathematics should have an adequate understanding of Advanced Calculus and Ordinary Differential Equations.
(3) Students who wish to do graduate work in engineering or one of the mathematical sciences, should have an adequate understanding of Calculus, Ordinary Differential Equations, and Numerical Methods. (4) Students who wish to teach mathematics should have an adequate understanding of Advanced Calculus, Ordinary Differential Equations, and Statistics. (5) Students who wish to pursue a career in business or industry should possess knowledge of diverse statistical techniques.
Consultant's Report: Comments on the design and effectiveness of core courses used as an assessment tool.
Consultant's Grades: Grades (A-F) are assigned in three areas regarding the effectiveness of the core courses and exams used as an assessment tool: (1) how well studying the course topics would help students satisfy the outcome goals, (2) how well achieving good grades on the final exams would indicate that students have satisfied the outcome goals, and (3) how well the student's performances demonstrate that students have satisfied the outcome goals.
Remarks: Under the old assessment plan, data was collected and assessed on a calendar year basis. Each year, One learning outcome was assessed. Results shown in this table is based on data from Calendar year 2010-13.

BS Mathematics – FY14 (Based on the New Assessment Plan, see attachment)

Learning Outcomes (most program will have multiple outcomes)	**Assessment Tool (e.g., portfolios, rubrics, exam)**	**Target/Criteria (desired program Level achievement)**	**Results**	**Analysis**
Students should be able to communicate mathematical concepts in writing.	Assessment score assigned by the instructor of Math 415 that is based on student's performance on assessment problems	70% of majors who take Math 415 have the assessment score of 3 or greater.	FY14: 86% of 21 majors who take Math 415 have score of 3 or better.	Target exceeded
Student should demonstrate a good understanding of mathematical reasoning at the level of Advanced Calculus.	Assessment score assigned by the instructor of Math 547 that is based on student's performance on assessment problems	70% of majors who take Math 547 have the assessment score of 3 or greater.	FY14: 70% of 10 majors who take Math 547 have score of 3 or better.	Target met
Students should have an adequate understanding of mathematical applications in physical sciences.	Assessment score assigned by the instructor of Math 555 that is based on student's performance on assessment problems	70% of majors who take Math 555 have the assessment score of 3 or greater.	FY14: 75% of 4 majors who take Math 555 have score of 3 or better.	Target exceeded
Students should have an adequate understanding of numerical methods in mathematical computations.	Assessment score assigned by the instructor of Math 551 that is based on student's performance on assessment problems	70% of majors who take Math 551 have the assessment score of 3 or greater.	FY14: 100% of 16 majors who take Math 555 have score of 3 or better.	Target exceeded
Students should have an adequate understanding of diverse statistical techniques.	Assessment score assigned by the instructor of Stat 571 that is based on student's performance on assessment problems	70% of majors who take Stat 571 have the assessment score of 3 or greater.	Stat 571 was not offered in Spring 2014	N/A
Remarks: The new assessment plan was implemented in the spring of 2014. Results shown in this table only include assessment data from Spring 2014. Assessment data from Summer 2014 and Fall 2014 are available upon request, which will be included in the assessment result for FY15.				

BS Physics

Learning Outcomes (most programs will have multiple outcomes)	Assessment Tool (e.g., portfolios, rubrics, exams)	Target/Criteria (desired program level achievement)	Results	Analysis
Students acquire proficiency in physics	GRE Exam in Physics taken by all Physics majors	Meet target:>50th percentile Exceed target:>70th percentile	FY12-14：Of 7 graduates who took GRE in Physics from Sp12 to F14, 3 met the expectations and 1 exceeded the expectations with a score >80%	Met the goal of the maintaining a 50% or higher rate of meeting expectations (4 of 7).
Remark 1: One of the students who got a bad GRE score is nonetheless now at CERN working on the LHC. Other students went to graduate study at Michigan Tech University, the University of Iowa, Dartmouth, etc. These facts shows that our performance is high enough to get students recruited by prestigious universities in US and Canada.				
Remark 2: Results shown in this table are mainly based on the current assessment plan for BS Physics (see the attachment). A new plan will be generated with breakdown learning outcomes to be implemented in the next year.				

MS Mathematics

Learning Outcomes (most programs will have multiple outcomes)	Assessment Tool (e.g., portfolios, rubrics, exams)	Target/Criteria (desired program level achievement)	Results	Analysis
Students acquire knowledge of mathematical and statistical theory and methods taught in at least 8 graduate courses at 700+ level.	Grade point average. For each year 4 numbers are recorded: total # students; Number with gpa>=3.0; gpa>=3.5; gpa>=3.9	90% of students enrolled in program have gpa>=3.0. Other data indicate grade distribution.	FY12: 27,25,19,10 FY13: 25,24,20,13 FY14: 22,21,15,4	Target met; FY12: 3+93%, FY13: 3+ 96%, FY14: 3+ 95%
Students should master, in depth, 3 areas in mathematics and/or statistics chosen by the students.	Oral Comprehensive Exam. At least 3 examiners rate student's performance on these 3 areas on a scale of 1 to 5 (high).	Two percentages are given: scores of 3 or above; scores of 5. Target: 3+: 95%	FY12:3+: 94%,5: 62% FY13:3+: 100%,5: 84% FY14:3+: 100%,5: 42%	Target met in 2 of 3 years. Three year rate, 3+: 98%,5: 55%
Students are able to communicate mathematical concepts effectively and accurately in writing.	Comprehensive Exam. Three examiners rate student's written work on a scale of 1 to 5 (high)	Two percentages are given: scores of 3 or above; scores of 5. Target: 3+: 95%+	FY12:3+: 100%,5:58% FY13:3+: 100%,5:90% FY14:3+: 96%,5: 41%	Target exceeded
Students are able to orally communicate mathematical concepts effectively and accurately.	Comprehensive Exam. Three examiners rate student's oral presentation on a scale of 1 to 5 (high)	Two percentages are given: scores of 3 or above; scores of 5. Target: 3+: 95%+	FY12:3+: 75%,5: 50% FY13:3+: 100%,5: 91% FY14:3+: 96%,5:41%	Target met in 2 of 3 years. Three year rate, 3+: 94%,5: 61%
The assessment procedure for the MSP graduate programs was modified in 2012 (e.g. March 16, 2012) and this caused some "teething problems" with the assessment of the MS program. In addition, the second and fourth Learning Outcomes suffered from the problems of small sample size and some faculty confusion. These issues have largely been resolved and it is anticipated that all Learning Outcome targets for the MS program will be met in future years.				

PhD Applied Mathematics

Learning Outcomes (most programs will have multiple outcomes)	Assessment Tool (e.g., portfolios, rubrics, exams)	Target/Criteria (desired program level achievement)	Results	Analysis
Mastery of core subjects	Qualifying Exam: Each examiner rates each student on a scale of 1 to 5 (high) on each subject	80% of scores are 3 or higher	FY 12, FY13 and FY14 100% of scores are 3 or higher	Three year rate, 100%, exceeds target
Mastery of research specialization area	Preliminary Exam: Each examiner rates each student on a scale of 1 to 5 (high)	90% of scores are 3 or higher	FY 12, FY13 and FY14 100% of scores are 3 or higher	Three year rate, 100%, exceeds target
Acquire knowledge in a research area and engage in current research	Progress in program	75% of students who pass Qualifying Exam should finish dissertation within 6 years	Beginning with FY06, 13 of 15 students finished the PHD within 6 years of passing Quals	Target exceeded; 87% rate
Student should be able to orally communicate mathematical concepts	Preliminary and Final Exam: Each examiner rates each student on a scale of 1 to 5 (high)	90% of scores are 3 or higher	FY 12, FY13 and FY14 100% of scores are 3 or higher	Three year rate, 100%, exceeds target
Complete significant, publishable research	Dissertation Defense: Each examiner rates each student on a scale of 1 to 5 (high)	100% of scores are 3 or higher	FY 12, FY13 and FY14 100% of scores are 3 or higher	Target met
Complete significant, publishable research	Post graduation publication record	60% of doctoral graduates should publish the results of dissertation within 4 years	6/10 graduates from FY08 to FY12 published within 4 years	Target met

d. Provide aggregate data on student majors satisfaction (e.g., exit surveys), capstone results, licensing or certification examination results, employer surveys or other such data that indicate student satisfaction with the program and whether students are learning the curriculum (for learner outcomes, data should relate to the goals and objectives of the program as listed in 1e).

Evaluate table 10 from the Office of Planning and Analysis regarding student satisfaction data.

Student satisfaction with MSP undergraduate programs was generally higher than student satisfaction with LAS or with WSU programs in general. Student satisfaction with MSP graduate programs was 100% every year while student satisfaction with LAS and WSU graduate programs varied from 74% to 83%

Learner Outcomes (e.g., capstone, licensing/certification exam pass-rates) by year, for the last three years				
Year	N	Name of Exam	Program Result	National Comparison±
1		NA		
2		NA		
3		NA		

e. Provide aggregate data on how the goals of the *WSU General Education Program* and *KBOR 2020 Foundation Skills* are assessed in undergraduate programs (optional for graduate programs).

Outcomes: o Have acquired knowledge in the arts, humanities, and natural and social sciences o Think critically and independently o Write and speak effectively o Employ analytical reasoning and problem solving techniques	Results	
	Majors	Non-Majors

Note: Not all programs evaluate every goal/skill. Programs may choose to use assessment rubrics for this purpose. Sample forms available at: http://www.aacu.org/value/rubrics/

f. For programs/departments with concurrent enrollment courses (per KBOR policy), provide the assessment of such courses over the last three years (disaggregated by each year) that assures grading standards (e.g., papers, portfolios, quizzes, labs, etc.) course management, instructional delivery, and content meet or exceed those in regular on-campus sections.

Provide information here:

We had concurrent enrollment in the three years under review: the last such enrollment was in the Spring 2014. There is no concurrent enrollment in 2015FY (per WSU Administration decision). In the Attachment #1e we have put the corresponding Assessment Plan together with Assessment outcomes in the previous years. As one can see we are in full compliance with KBOR policy.

g. Indicate whether the program is accredited by a specialty accrediting body including the next review date and concerns from the last review.

Provide information here: Not accredited.

h. Provide the process the department uses to assure assignment of credit hours (per WSU policy 2.18) to all courses has been reviewed over the last three years.

Provide information here:

The process the department has used to assign credit hours to every course that has been offered in the past three years (either new offering or a previous course reviewed for any reason) has been in full compliance with WSU policy 2.18 (http://webs.wichita.edu/inaudit/ch2_18.htm). The procedure we have followed is identical to the one described in item 3. of Policy 2.18.

i. Provide a brief assessment of the overall quality of the academic program using the data from 3a – 3f and other information you may collect, including outstanding student work (e.g., outstanding scholarship, inductions into honor organizations, publications, special awards, academic scholarships, student recruitment and retention).

The academic programs for the MSP department are very strong. Students in these programs are well prepared, as demonstrated by ACT scores and entering GPA scores. The assessment targets for the undergraduate and graduate programs are met or exceeded for almost every Learning Outcome. Enrollment in the PhD program is strong and between ten (10) and sixteen (16) new graduates of the PhD program are anticipated by July, 2017. Student satisfaction with the MSP programs is high, including 100% satisfaction with the MSP graduate programs.

4. Analyze the student need and employer demand for the program. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).

a. Evaluate tables 11-15 from the Office of Planning Analysis for number of applicants, admits, and enrollments and percent URM students by student level and degrees conferred.

For the BS (Math) program: Students are applying to the Math program (FY2012: 26; FY2013: 24; FY2014: 34), being admitted (FY2012: 26; FY2013: 21; FY2014: 34), and enrolling (FY2012: 18; FY2013: 11; FY2014:

For the BS (Physics) program: Students are applying to the Physics program (FY2012: 14; FY2013: 23; FY2014: 320, being admitted (FY2012: 13; FY2013: 23; FY2014: 18), and enrolling (FY2012: 7; FY2013: 18; FY2014: 11) in sufficient numbers for the sustainability of the program.

For the MS program: Students are applying to the MSP graduate programs (FY2012: 30; FY2013: 36; FY2014: 32), being admitted (FY2012: 26; FY2013: 26; FY2014: 22), and enrolling (FY2012: 20; FY2013: 18; FY2014: 13) in sufficient numbers for the sustainability of the programs. (The data in Table 11 is not broken down by graduate program.) Enrollment in the MS program is appropriate (FY2012: 30; FY2013: 27; FY2014: 24) and above the KBOR minimum of 20. Approximately 60% of enrolled MS students are white non-hispanic (FY2012: 17/30; FY2013: 17/27; FY2014: 16/24), 14% are foreign (5/30; 3/27; 3/24) and other groups include asian (3/30, 3/27, 3/24), hispanic (2/30; 2/27; 1/24) and black non-hispanic (0/30; 1/27; 0/24) according to Table 13; however, between 0% and 20% of the MS graduates are under-represented minorities according to Table 14 (FY2012: 0%; FY2013: 12.5%; FY2014: 20%). It would be desirable if the numbers of under-represented minorities in the MS program increased; however, with essentially no funding at the department level for advertising and recruiting, MSP is at the mercy of the college and university with respect to attracting under-represented minorities to the MS program.

For the PhD program: Students are applying to the MSP graduate programs (FY2012: 30; FY2013: 36; FY2014: 32), being admitted (FY2012: 26; FY2013: 26; FY2014: 22), and enrolling (FY2012: 20; FY2013: 18; FY2014: 13) in sufficient numbers for the sustainability of the programs. (The data in Table 11 is not broken down by graduate program.) Enrollment in the PhD program is appropriate (FY2012: 15; FY2013: 13; FY2014: 14) and above the KBOR minimum of 10. Approximately 45% of enrolled PhD students are white non-hispanic (FY2012: 8/15; FY2013: 6/13; FY2014: 5/14), 45% are foreign (6/15; 6/13; 7/14), and 7% asian non-hispanic (1/15; 1/13; 1/14) according to Table 13. There were no students in the PhD program who were classified as black non-hispanic, hispanic, american indian/alaskan native, hawaiian or multiple race. However these groups do not seem to choose to enter PhD programs in MSP in large numbers; for example, according to the 2013 American Mathematical Society "Report on New Doctorial Recipients", of 1843 PhDs in mathematics granted in 2012-13, black non-hispanic students earned 2% (44) of these degrees, hispanic students earned 4% (65) of these degrees, american indian/alaskan native students earned 0% (5) of these degrees, asian non-hispanic (domestic or foreign) students earned 43% (800) of these degrees and white non-hispanic students earned 49% (894) of these degrees. It would be desirable if the numbers of under-represented minorities in the PhD program increased; however, with essentially no funding at the department level for advertising and recruiting, MSP is at the mercy of the college and university with respect to attracting under-represented minorities to the PhD program.

b. Utilize the table below to provide data that demonstrates student need and demand for the program.

BS Math

Employment of Majors*							
	Average Salary	Employ-ment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or profes-sional educa-tion	Projected growth from BLS** Current year only.
Year 1	NA	100%				4	
Year 2	$41,000	100%				0	
Year 3	$37,000	100%				2	NA (Data for MS and PhD only)

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

BS Physics

Employment of Majors*							
	Average Salary	Employ-ment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or profes-sional educa-tion	Projected growth from BLS** Current year only.
Year 1	NA					1	
Year 2	NA					0	
Year 3	NA					0	NA (Data for MS and PhD only)

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

MS Math

Employment of Majors*							
	Average Salary	Employ-ment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or profes-sional educa-tion	Projected growth from BLS** Current year only.
Year 1	$43,000	80%	100%			1	
Year 2	$43,000	71%	100%			3	
Year 3	$43,000	60%	90%		10%	4	23%（salary $101,360）

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

PhD Math

Employment of Majors*							
	Average Salary	Employ-ment % In state	Employment % in the field	Employment: % related to the field	Employment: % outside the field	No. pursuing graduate or profes-sional educa-tion	Projected growth from BLS** Current year only.
Year 1	$50,000	33%	100%			0	
Year 2	$63,000	50%	100%			0	
Year 3	$45,000	0%	100%			0	23%（salary $101,360）

* May not be collected every year

** Go to the U.S. Bureau of Labor Statistics Website: http://www.bls.gov/oco/ and view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data)

Provide a brief assessment of student need and demand using the data from tables 11-15 from the Office of Planning and Analysis and from the table above. Include the most common types of positions, in terms of employment graduates can expect to find.

Provide assessment here:

Since the 2012 review of the PhD program, seven (7) students have earned PhD degrees in Applied Mathematics. Of these recent graduates, five have gone into academic careers and two have started non-academic careers. Two of these graduates following academic careers are assistant professors in foreign nations, one was a post doc associated with Harvard and is now a Research Associate at Imperial College London, one is an assistant professor in the SUNY system and one is an instructor in MSP coordinating distance education for the department. Another graduate (in December 2012) of our PhD program, Maryssa Metheny, is an associate data scientist at DST systems in Kansas City.

International students make up 50%-60% of our student population, including 3 students with external grants; additional students with external support are applying to the program. It is noted that the vast majority of our international graduates have obtained highly productive jobs in the U.S. and many are now U.S. citizens.

The data provided by WSU's Business Intelligence & Predictive Modeling (BIPM) office is sparse with regard to salary information; for example, there were 14 valid replies and 31 missing replies in the 2012-14 surveys for the BS in mathematics, 5 valid replies and 7 missing replies in the 2012-14 surveys for the BS in physics and 18 valid replies and 14 missing replies in the 2012-14 surveys for the MSP graduate programs. In addition, the proportions of students who went to graduate school, obtained full-time jobs and left the workforce (and at least one MS graduate left the workforce as a new mother) are not clear; these career paths have significantly different initial salary expectations.

5. Analyze the service the Program provides to the discipline, other programs at the University, and beyond. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).

Evaluate table 16 from the Office of Planning Analysis for SCH by student department affiliation on fall census day.

In the Department of Mathematics, Statistics and Physics, most of our classes offered are services classes to student in other majors and general education fulfillment requirement classes. This causes a large burden of introductory classes to be taught. Many of these classes are taught by short term lecturers, many of whom are our MS and PhD students taking their first job, adjunct or guest professors and, where possible graduate students. While all of the regular tenured and tenured-track faculty have active research activities, the lecturers and adjuncts simply fulfill the teaching roll assigned to them. In many cases this results in simply servicing the classes without any research accompanying activity and, in some cases, the use of these temporary lecturers and guest faculty results in less experienced instruction, especially for the evening classes. There are many ways to get around this problem with a slight increase in funding that would provide a high payback to the University on the research funded activities. We highly encourage the administration to discuss these arguments. We have seen in the 5 year enrollment averages a 4% and 2.5% jump in Student Credit Hours for Mathematics and Statistics classes from 2008-2012 to 2009-2013 and 2009-2013 to 2010-2014 academic years, while in Physics these numbers have had a 3.6% and a 2.9% increase in the corresponding 5 year enrollment average Student Credit Hour numbers. With the continued enrollment of Freshmen at Wichita State University projected to be 20% over the next four years, this will certainly result in a continued growth of Student Credit Hours for Mathematics and Physics; however, continued growth in class instruction by simply hiring more graduate students or lectures without supporting an increase in tenure track faculty will not be able to satisfy this growth because the number of graduate students is limited by the research active faculty, which continues to drop due to faculty departures, retirements and deaths that are not being quickly replaced. This will result in a crisis of not being able to provide adequate instruction for the growing Mathematics and Physics demand unless action is started this coming academic year to properly address these faculty and lecturer needs.

a. Provide a brief assessment of the service the Program provides. Comment on percentage of SCH taken by majors and non-majors, nature of Program in terms of the service it provides to other University programs, faculty service to the institution, and beyond.

Provide assessment here:

As a consequence of the mission of our department, most of our SCH is produced by non-majors. This is (especially in the graduate programs) dictated by very limited funds (stipends, assistantships, etc.) to support our students.

The Department of Mathematics, Statistics, and Physics is larger in student credit hours production than three WSU colleges (Education, Fine Arts, and Engineering). We however are the most inexpensive in terms of the expenditure of university resources.

6. Report on the Program's goal (s) from the last review. List the goal (s), data that may have been collected to support the goal, and the outcome. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).

(For Last 3 FYs)	Goal (s)	Assessment Data Analyzed	Outcome
Review of Triggered Programs; Strategic Plan	Recruit 3 new students each year	Data reported above for FY12, FY13 and FY14.	FY12: 6; FY13: 5; FY14: 5
	Maintain minimum of 10 students in program each year	ditto	FY12: 15; FY13:13; FY14:14
	Graduate a minimum of 2 students each year	ditto	FY12: 3; FY13:2; FY14:2

The PhD program currently has 20 students working toward completion. Of these, we anticipate one graduate in SP15, one in SU15, at least one in FL15 and at least two more by SP16. Between April 2015 and July 2017, we anticipate between ten (10) and sixteen (16) students to earn PhD degrees in Applied Mathematics. Student demand for the PhD program has increased recently and some students with strong academic records who previously would have been admitted and supported may not be offered graduate assistant support in the future. This raises some concerns about the number of PhD graduates after 2017; however, we gained strong new PhD students in 2014-15, have highly talented applicants for FL15 and the only barrier to maintaining strong PhD classes in the future is the level of GTA/GRA/GSA support from WSU.

7. Summary and Recommendations

a. Set forth a summary of the report including an overview evaluating the strengths and concerns. List recommendations for improvement of each Program (for departments with multiple programs) that have resulted from this report (relate recommendations back to information provided in any of the categories and to the goals and objectives of the program as listed in 1e). Identify three year goal (s) for the Program to be accomplished in time for the next review.

Provide assessment here:

In terms of credit hours production, our department is highly cost effective. We also are highly productive in publishing papers in refereed journals, applying for grants, etc. To maintain our excellent reputation in research, we need to return our faculty numbers to those in the previous decade. This preserves programs and overall stability, departments usually replace personnel when departures or retirements occur because it affords an opportunity to lower the average age of faculty in order to strengthen the department for the future.

To continue the educational effectiveness in our graduate programs, we have to constantly keep attracting talented students. At this time the stipends we have for our GTAs are not competitive with those at peer institutions; a serious increase in funding of these stipends is necessary. As enrollment at the university increases, we need to increase the number of graduate assistantships; for a research university of our size, we have relatively few graduate assistants.

Enrollments in first year physics for scientists and engineers are growing steadily with class sizes capped at 35 students to insure quality instruction. This situation has put increasing demands on instructional staff, classroom space, labs, and student lab assistants. Requests to KBOR for labs fees are being considered.

To further increase efficiency and the productivity of our faculty and GTAs, we need to continue being on the forefront of the computer revolution which is rapidly changing the way we teach and do research. The use of state-of–the-art technology already benefits us and our students tremendously. To continue utilizing the currently available technology we need to be aware of the latest developments in educational software. One critical need is more computer equipped classrooms. LAS provided us with one such facility years ago. It is being constantly used and provides us with obvious opportunities for computer use in teaching mathematics and statistics classes. However, it holds only 32 students at a time and at least one more such classroom is needed.

In light of the above observations, we are setting the following goals for the next 3 years.

I. FACULTY POSITIONS.

We represent three major STEM disciplines. We are essentially three departments under one roof: Statistics, Mathematics, and Physics. In terms of faculty structure we are stressed in all three departments and near the breaking point in Statistics.

(a) Statistics.

We need two tenure-track positions for FY2017. We have not hired any statisticians in the past 15 years. In FY2017, we will have only three statisticians (75% of the statistics portion of the department; we need a minimum of four PhD statisticians); in addition, one of the three remaining statisticians has been on the faculty since 1967, was on medical leave in the Fall 2014 semester and will, eventually, no longer be teaching statistics at WSU. Our goal is to hire two new statisticians to replace one retiring statistician and to prepare for the eventual retirement of another statistician. We will be unable to provide an adequate graduate education in statistics and our ability to provide an adequate undergraduate education in statistics will be strongly diminished without filling those two positions by Fall 2016. We have a number (8+) graduate students studying statistics, include five PhD students in statistics, and the demand for a graduate statistics education is increasing. Since we didn't get the statistics positions we requested for FY2016, one of our statisticians (Hari Mukerjee) postponed his retirement till next year. We need one Assoc. Prof. to oversee the large number of stat classes taken by students of various colleges (26 sections per year with 35 students in each; mostly taught by Instructors, Lecturers, and GTAs). We also need to fill another position in Statistics (Asst. Prof.) to teach our Masters and PhD students (the demand for the statistics degree is growing). We are also missing out on grant activity in an area where there are very good possibilities.

(b) Mathematics.

We need a minimum of two tenure-track positions for FY2017. Due to loss of Alan Elcrat, Ken Miller, Andrew Acker, John Robertson, Christian Wolf we are in a very difficult situation with our applied math program. Over the last 5 years we lost eight (8) Professorial positions, and were allowed to hire only two (Mark Walsh and Catherine Searle). The losses we suffered not only hurt our graduate program, it also severely limited our abilities to apply for outside grants. We have lost faculty in Analysis (e.g. fluid dynamics, inverse problems, numerical analysis, partial differential equations), which was and is our strongest research concentration and the principal area for which our research is known nationally; these areas attracted many of our graduate students. This area was also our major contact with the engineering community and also our major source for grant support. The main Fluid Dynamics people are gone. Next year we'll have only two trained Numerical Analysts, one of whom is very busy as Department chair, and numerical analysis is an important part of our graduate education. We are also missing out on applying for the abundant grant possibilities in these areas (in the past we received over a million dollars of grants by faculty in these areas).

(c) Physics.

The request is for one tenure-track position for 2017 FY. Enrollments in first year physics for scientists and engineers are growing steadily with class sizes capped at 35 students to insure quality instruction. This situation has put increasing demands on instructional staff, classroom space, and labs. The credit hour production of the physics department has increased by over 40% due to the full transfer back to LAS of all physics classes. Since first year calculus-based physics for scientists and engineers basically gives an overview of the entire undergraduate physics curriculum, it is important that PhD level faculty, preferably with research programs of their own, teach these courses.

The Physics group is currently formulating a plan to restart the suspended MS degree in Physics. This is discussed in goal III, below.

II. GRADUATE PROGRAM SUPPORT

The request is for an increase in the graduate assistant budget. Our Ph.D. alumni include tenured faculty members at the University of Arizona and Georgetown University, as well as at other universities like Kent State University and Towson University, and tenure-track faculty at universities like Texas State University--San Marcos and Xavier University. Graduating PhDs who become tenured faculty members at well-known and respected universities enhances the reputation of Wichita State University and attracting undergraduates from outside Kansas depends, in part, on a favorable university reputation. Our PhD program is on the verge of remarkable success; we anticipate at least ten (and possibly up to 16) new PhD graduates by July 2017. We need to continue to attract strong new PhD students. Unfortunately, the amounts of our graduate stipends is significantly lower than our peers and the number of MSP students with graduate assistantships is significantly lower than at research universities of our size which emphasize science, technology, engineering and the mathematical sciences.

The second goal of the department is to increase the level of financial support for the MSP graduate programs so as to increase the number of graduate assistants and increase their stipends to competitive national levels and to attract the best possible students to these graduate programs by increasing national recruitment and advertising our (requested) nationally competitive stipend levels. The department's plan for advancing this goal would be to increase the budget of the graduate program from the current level of $353,000 (from LAS and the Graduate School) to a level of $500,000 over two years. In FY93, for example, the graduate programs in Mathematics and Statistics were allocated approximately $253,000 (from LAS and the Graduate School); in 2015 dollars, this would be worth approximately $420,000. With the anticipated enrollment increase and hence the need for additional GTAs to teach lower division MSP courses, this request is in alignment with university goals.

Additional graduate assistants will be required to support the anticipated increased enrollments at WSU and an enhanced recruitment of new graduate students provides the expectation that additional Ph.D. alumni become professors at well-respected universities. Additional financial resources increases the opportunity to offer additional GRAs, which provide Ph.D. students with opportunities to enhance their publication records and possibly to obtain postdoc positions at universities like Cal Tech, Harvard and Stanford; students with postdocs at prestigious universities have enhanced chances of obtaining faculty positions at good research universities.

III. PHYSICS MASTERS PROGRAM and OUTREACH TO THE INOVATION CAMPUS

A plan is being formulated to restart the suspended MS degree in Physics. This will provide increased opportunities for students in STEM fields. A physics option was introduced into the Applied Mathematics PhD program in 2012, in addition to the existing mathematics and statistics options. The Physics MS will potentially feed into this new option, providing even more possibilities for students and increasing chances for physics faculty to bring in external funding, as they did previously when their MS program was active. Although the restart of the Physics MS is being formulated to work with existing resources and staff, one part of the plan is to explore possibilities for joint hires with Engineering or other science departments in areas of mutual interest. For instance, materials science is an active area in both the physics group and Mechanical Engineering and a joint hire could share research labs and teaching duties. Other areas of cooperation include or have included chemical physics, quantum information, improvement of WSU high performance computational facilities, and development of space satellites for solar physics observations.

The Math/Stat/Physics Department will explore the possibilities of joint work across a broad spectrum of applied science, technology, and engineering, as the Innovation Campus unfolds. Since the start of the Applied Mathematics PhD program in the 1980s there have been a number of collaborative efforts involving our research faculty and PhD students. Joint projects have been undertaken in fluid dynamics, computational mechanics for the crash sled, scientific computing, inverse problems in cabin acoustics for business jets, computational electro-magnetics for lightening strike research, and statistical analysis. External funding supporting these projects has come from the NSF and NSF EPSCoR, the FAA, the Air Force Office of Scientific Research, and Admark grants. At least two former PhD students (Clarkson, Harder) and one faculty member (Hrycak) have been on the staff of NIAR. We anticipate involvement in more joint projects in the future, in areas related to the proposed WSU research clusters. Rebuilding our research faculty to former levels will enhance such opportunities greatly.

DEPARTMENT OF MATHEMATICS, STATISTICS, AND PHYSICS

2015 SELF-STUDY REPORT

Attachment #1.

UNDERGRADUATE ASSESSMENT PLAN
New Assessment Plan

Department: Mathematics, Statistics, Physics

Program: Mathematics and Statistics (BS)

I. Program Mission

The mission of the undergraduate program in Mathematics and Statistics is to provide a broadly based program that will prepare students either for graduate study in mathematics and statistics, or for mathematics-statistics related employment in academic, industrial or governmental positions.

II. Program Goals

1. To provide students with a broadly based program of study in which they acquire knowledge of mathematics and statistics at the undergraduate level.

2. To prepare students for
    - graduate study in mathematics or statistics.
    - graduate study in engineering or other physical sciences.
    - a career in teaching at middle or high schools.
    - a career in business or industry.

III. Learner Outcomes

The student will:
1. Communicate mathematical concepts in writing.
2. Demonstrate mathematical reasoning at the level of Advanced Calculus.
3. Provide mathematical applications to physical sciences.
4. Describe and employ numerical methods in mathematical computations.
5. Demonstrate use of diverse statistical techniques.

IV. Assessment of Learner Outcomes

Each learner outcome listed above is associated with an assessment course listed in the following table.

Learner Outcome	Assessment Course
Learner Outcome 1	Math 415, Introduction of Advanced Mathematics
Learner Outcome 2	Math 547, Advanced Calculus I
Learner Outcome 3	Math 555, Differential Equations I
Learner Outcome 4	Math 551, Numerical Methods
Learner Outcome 5	Stat 571, Statistical Methods I

The assessment of each learner outcome is conducted through the corresponding assessment course by the following procedure. The same procedure applies to all the learner outcomes.

1. The student's knowledge of certain topics will be used in assessing learner outcomes 1-5 through the assessment courses.

2. The department will maintain a list of problems which are representative of problems/questions that the instructors of assessment courses should include on tests, quizzes, and/or the final exam during the semester in order to assess a student's knowledge of these topics.

3. The instructors will keep data on the performance of each math major on those problems being used for assessment purposes.

4. At the end of the semester, the instructors will evaluate each math major's performance in each of the topics covered in the assessment courses. Based on a student's performance on the assessment problems, the instructors will assign, for each math major enrolled, a numerical score (1-5, with 5= excellent, 4=good, 3=satisfactory, 2=less than satisfactory, and 1=poor) on each topic covered, and then calculate the average score of these assigned scores, which is considered as his/her assessment score for the assessment course.

5. The instructors will report the scores on report forms. The instructors will then return the forms to the departmental assessment committee. The forms will be kept on file for five years.

6. For each fiscal year and for each learner outcome, the assessment committee will calculate the percentage of math majors whose assessment score is 3 or greater.

V. Assessment Target

For each fiscal year and for each learner outcome, 70% of the math majors who take the assessment course have an assessment score of 3 or greater.

In case where the above target is not satisfied for a particular learner outcome in two consecutive years, the assessment committee will have a special meeting with the instructors of the assessment course and the course committee to discuss plans to improve the teaching outcome. The assessment reports from the external consultants (see below) will also be used to in the possible revision of the course plan.

VI. Assessment by External Consultants

In addition to the above assessment process, we hire external consultants from prestigious universities outside Kansas to evaluate assessment courses (one or two each year).

At the end of each semester, the department will collect from each instructor of each assessment course the following materials:

- The syllabus.
- Copies of the tests given.
- Copies of representative graded examples of student work on each test.
- The graded Final Comprehensive Examination for all students.

This material will constitute the basic file of information for the assessment course.

This file will be reviewed annually in a form which maintains student anonymity by an external consultant, who will visit the department for a period of two days to examine the file and form a complete and first-hand impression of the program being assessed. This consultant will evaluate the program and mail a brief written report to the department.

VII. Feedback Loop Used by the Faculty

The department has an Undergraduate Assessment Committee composed of three faculty members appointed by the department chairperson. Each year, the committee meets to review assessment results as well as the consultant's report on the evaluated assessment courses. An assessment report will be generated and submitted to the chairperson. The assessment committee will, based on the comments from the external consultant, recommend revisions to the course designs for the assessment courses evaluated by the consultant.

BS Mathematics – FY14 (Based on the New Assessment Plan)

Learning Outcomes (most program will have multiple outcomes)	Assessment Tool (e.g., portfolios, rubrics, exam)	Target/Criteria (desired program Level achievement)	Results	Analysis
Students should be able to communicate mathematical concepts in writing.	Assessment score assigned by the instructor of Math 415 that is based on student's performance on assessment problems	70% of majors who take Math 415 have the assessment score of 3 or greater.	FY14: 86% of majors who take Math 415 have score of 3 or better.	Target exceeded
Student should demonstrate a good understanding of mathematical reasoning at the level of Advanced Calculus.	Assessment score assigned by the instructor of Math 547 that is based on student's performance on assessment problems	70% of majors who take Math 547 have the assessment score of 3 or greater.	FY14: 70% of majors who take Math 547 have score of 3 or better.	Target met
Students should have an adequate understanding of mathematical applications in physical sciences.	Assessment score assigned by the instructor of Math 555 that is based on student's performance on assessment problems	70% of majors who take Math 555 have the assessment score of 3 or greater.	FY14: 75% of majors who take Math 555 have score of 3 or better.	Target exceeded
Students should have an adequate understanding of numerical methods in mathematical computations.	Assessment score assigned by the instructor of Math 551 that is based on student's performance on assessment problems	70% of majors who take Math 551 have the assessment score of 3 or greater.	FY14: 100% of majors who take Math 555 have score of 3 or better.	Target exceeded
Students should have an adequate understanding of diverse statistical techniques.	Assessment score assigned by the instructor of Stat 571 that is based on student's performance on assessment problems	70% of majors who take Stat 571 have the assessment score of 3 or greater.	Stat 571 was not offered in Spring 2014	N/A
Remarks: The new assessment plan was implemented in the spring of 2014. Results shown in this table only include assessment data from Spring 2014. Assessment data from Summer 2014 and Fall 2014 are available upon request, which will be included in the assessment result for FY15.				

(old) UNDERGRADUATE ASSESSMENT PLAN FOR THE DEPARTMENT OF MATHEMATICS AND STATISTICS

University Mission

"High quality teaching and learning are fundamental goals in all undergraduate, graduate programs…" (Taken from the university's mission statement)

Department Mission

The mission of the undergraduate program in Mathematics and Statistics is to provide a broadly based program in undergraduate level mathematics and statistics which will prepare students either for graduate study in mathematics and statistics; or for mathematics-statistics related employment in academic, industrial or governmental positions.

Goals

1. Students majoring in mathematics should possess a common core of mathematical skills, leading to a better understanding of mathematical reasoning.
2. Students who wish to do graduate work in mathematics should have an adequate understanding of Advanced Calculus and Ordinary Differential Equations.
3. Students who wish to do graduate work in engineering or one of the mathematical sciences, should have an adequate understanding of Calculus, Ordinary Differential Equations, and Numerical Methods.
4. Students who wish to teach mathematics should have an adequate understanding of Advanced Calculus, Ordinary Differential Equations, and Statistics.
5. Students who wish to pursue a career in business or industry should possess knowledge of diverse statistical techniques.

Learner Outcomes

Students who complete our core courses will demonstrate competence in the computational skill taught in these courses as well as a familiarity with the underlying concepts of these courses.

Assessment of the Program Goals

A. The department has selected the following five representative core courses to assess the program goals:

Course	Goal(s) Assessed
MATH 415 Introduction to Advanced Mathematics	1
MATH 547 Advanced Calculus I	1, 2, 3, and 4
MATH 551 Numerical Methods	3
MATH 555 Differential Equations	2, 3, and 4
STAT 571 Statistical Methods I	4 and 5

At the end of each semester, the department will collect from each instructor of one of the core courses listed above the following materials:

- The syllabus.
- Copies of the tests given.
- Copies of representative graded examples of student work on each test.
- The graded Final Comprehensive Examinations for all students.

This material will constitute the basic file of information on the program offered to students. This file will be reviewed annually in a form which maintains student anonymity by an external consultant, who will visit the department for a period of two days to examine the file and form a complete and first-hand impression of the program being assessed. This consultant, who will be a mathematician from a university outside of Kansas or a professional mathematician from business, industry, or research, will evaluate the program and mail a brief written report to the department.

B. At the end of each semester, graduating seniors will complete the *Graduating Senior Exit Survey*. Through this survey the Department of Mathematics and Statistics will assess the program goals.

C. Every five years the department will survey past graduates in Mathematics and Statistics. This survey will also be used to measure and assess the program goals.

Learner Outcomes Assessment

1. Each representative core course will be evaluated by a comprehensive final exam. This final exam will include, for assessment purposes, 2 or 3 problems selected from a list of problems prepared in advance by the department. The list of problems will contain about 15-25 questions (or problems) emphasizing fundamental concepts of the course. The list will be provided to the students in advance, along with an explanation of its role in the final exam.
2. An individual file will be created and maintained for each current math major. For each current major, this file will include (a) graded final exams in those representative core courses which he or she participated in, (b) his or her average score (percent) in those same representative core courses. These files will be kept for 5 years following graduation.
3. The department will provide to the consultant, at his or her request, any available and appropriate statistical information about math majors.

Results

The following is a brief outline of the most recent report from Professor V. Wickerhauser of Washington University in St. Louis, our external consultant who reviewed the basic file for Math 551 in March 2004.

1. The workload is substantial. To spread some of this workload, it may aid the class to have Math 551 students from previous semesters available in the computer lab as consultants.
2. The choice of textbook is excellent.
3. The course preparation is substantial.
4. The midterm project is challenging and the final examination has a reasonable difficulty gradient: about half the students demonstrated competence on the two difficult questions in the final.
5. The anonymous student evaluations are comparable to those for an upper division Mathematics course as at Washington University.

Feedback Loop

The faculty who do the most scientific computing (DeLillo and Elcrat) will continue to integrate MATLAB into the Math 551 curriculum and exploit the computer room for instructional purposes. The coordination between the introductory MATLAB course, Math 451, and Math 551 will be maintained through and we will make sample programs available to beginning students.

BS Mathematics –2010-2013 (Based on the Old Assessment Plan)

Learning Outcomes (most program will have multiple outcomes)	Assessment Tool (e.g., portfolios, rubrics, exam)	Target/Criteria (desired program Level achievement)	Results	Analysis
Students acquire understanding of mathematical reasoning and the advanced calculus. Related to outcome goal 1, 2, 3, and 4	Grades of assessment oriented final exams of Math 415 & 547, the consultant's report, and the grades assigned by the consultant.	70% of students who take Math 415 have grade of C or better. Good consultant's report and grades B or better.	2010: 95% of students enrolled have grade C or better. Excellent Consultant Report. Consultant's grades: A, A, A	Target exceeded.
Students acquire adequate understanding of numerical methods. Related to outcome goal 3.	Grades of assessment oriented final exam of Math 551, the consultant's report, and the grades assigned by the consultant.	70% of students who take Math 551 have grade of C or better. Good consultant's report and grades B or better.	2011: 96% of students enrolled have grade C or better. Excellent Consultant Report. Consultant's grades: A, A, A	Target exceeded.
Students acquire adequate understanding of ordinary differential equations. Related to outcome goal 2, 3, 4.	Grades of assessment oriented final exam of Math 555, the consultant's report, and the grades assigned by the consultant.	70% of students who take Math 555 have grade of C or better. Good consultant's report and grades B or better.	2013: 87% of students enrolled have grade C or better. Excellent Consultant Report. Consultant's grades: A, A, A	Target exceeded.
Students acquire knowledge of diverse statistical techniques. Related to outcome goal 4 and 5	Grades of assessment oriented final exam of Stat 571, the consultant's report, and the grades assigned by the consultant.	70% of students who take Stat 571 have grade of C or better. Good consultant's report and grades B or better.	2012: 100% of students enrolled have grade C or better. Excellent consultant Report. Consultant's grades: A, A, A	Target exceeded

Outcome Goals: (1) Students majoring in mathematics should possess a common core of mathematical skills, leading to a better understanding of mathematical reasoning. (2) Students who wish to do graduate work in mathematics should have an adequate understanding of Advanced Calculus and Ordinary Differential Equations. (3) Students who wish to do graduate work in engineering or one of the mathematical sciences, should have an adequate understanding of Calculus, Ordinary Differential Equations, and Numerical Methods. (4) Students who wish to teach mathematics should have an adequate understanding of Advanced Calculus, Ordinary Differential Equations, and Statistics. (5) Students who wish to pursue a career in business or industry should possess knowledge of diverse statistical techniques.

Consultant's Report: Comments on the design and effectiveness of core courses used as an assessment tool.

Consultant's Grades: Grades (A-F) are assigned in three areas regarding the effectiveness of the core courses and exams used as an assessment tool: (1) how well studying the course topics would help students satisfy the outcome goals, (2) how well achieving good grades on the final exams would indicate that students have satisfied the outcome goals, and (3) how well the student's performances demonstrate that students have satisfied the outcome goals.

Remarks: Under the old assessment plan, data was collected and assessed on a calendar year basis. Each year, One learning outcome was assessed. Results shown in this table is based on data from Calendar year 2010-13.

History of Consultant Visits

Year	Course	Consultant	University
1998	415-547	G. Uhlmann	Univ. of Washington
1999	555	G. Eskin	UCLA
2000	415-547	J. Sylvester	Univ. of Washington
2001	551	B. Fornberg	Univ. of Colorado
20023	572	S. Hedayat	Univ. of Illinois
2003	415-547	P. Stefanov	Purdue Univ.
2004	551	V. Wickerhaouser	Washington Univ.
2005	555	C. Shu	Brown Univ.
2006	572	J. Srivatstava	Colorado State Univ.
2007	415-547	K. Zhu	SUNY Albany
2008	551	L. Reichel	Kent State
2009	572	C. Cheng	UC Berkeley
2010	555	L. Cummings	Univ. of Waterloo
2011	415-547	D. Blackmore	NJIT
2012	551	X. Jiao	SUNY at SB
2013	572	M. Puri	Indiana Univ.
2014	555	J. McCuan	Geogia Tech
2015	415-547	J. Sylvester	Univ. of Washington

Assessment data from 2010-2013 that are based on the old assessment plan. For each year, the following items are included:

- External Consultant's Reports
- Annual Program Review Sheets

Georgia Institute of Technology

School of Mathematics
Atlanta, GA 30332-0160 U.S.A.
PHONE 404·894·2700
FAX 404·894·4409

Date: April 30, 2014

To: Professor Siqi Sun

From: John McCuan
School of Mathematics
mccuan@math.gatech.edu

Re: Math 555, Differential Equations I

Dear Professor Sun,

This is a summary of my evaluation of course materials for Math 555, Differential Equations I conducted in April of 2014. I will refer to the course as ODE I.

Broader assessment Though probably everyone who reads this will be aware of it, the assessment involves four topics (advanced calculus, differential equations, numerical methods, and statistics), and my evaluation applies only to the differential equations component.

One additional comment can be made under this heading. The general structure of the coursework here seems to be "compartmentalized" in the sense that the courses seem to be organized to have very little overlap. One advantage of this might be seen in some notion of "efficiency of presentation" of material. On the other hand, this character might be limiting for some instructors who wish to expand in particular directions and/or might lead to students being explicitly exposed to fewer connections and areas of overlap among the topics.

The ODE course in particular seems to be taught at a relatively high level, though the actual collection of subtopics is not so extensive as to prevent the inclusion of additional material in a semester course. There are some subtopics (numerics, systems, and dynamics) which some might prefer to see in this first course and which I understand are relegated to a second course in ODEs taught at Wichita State taken by fewer students. The topics that are chosen (pretty much according to the ordering of chapters in the text) is, however, a reasonable one.

The view that systems and dynamics take precedence over other topics (like series) was, for example, implemented at Georgia Tech where also there is no sequential follow up course and a lower level text (Brannan and Boyce) is used which does not include series solutions. My view is that the more extensive text (Boyce and DePrima) used at Wichita State is preferable, but perhaps more flexibility for instructors to include certain topics and omit others should be entertained here.

Specific assessment for ODE I (Math 555) Among the six folders of course materials I reviewed, there was considerable diversity. It's difficult to make specific suggestions because many aspects of that diversity are matters of taste and almost all of these materials would fall within the category of "reasonable" or even "standard." I think, however, that a broad distinction appears between approaches with broader appeal and those with more limited appeal. I do not mean by this, appeal to me or to a departmental administrator (depending on objectives), but appeal to students. Some of the approaches will appeal to a broader audience of students. One of the main factors in what I am calling "broader appeal" might be described as being "streamlined" or "self-contained" as opposed to "open ended." It should not be underestimated that approaches with limited appeal may also result in much deeper learning experiences for that smaller number of students to whom they appeal. The approach which is more effective depends on the objective. Is it the objective to have some group of students learn as much as they possibly can or to have as many students as possible learn something?

I cannot answer that question definitively, but in viewing the course materials, it is clear that some instructors convey the idea that everything is well-understood and the material is limited to well-worn topics. Other instructors convey the idea that the topics are *interesting* precisely because they may be complicated, difficult to understand or open-ended. The former approach will have broader appeal to students and will be more effective in getting a greater number of students to learn some specific things. The latter approach will, in my experience, be more effective in inspiring a few students to achieve a relatively much higher level of understanding of the course material. It depends, therefore, on the objectives. (My use of the term "objectives" here is, of course, subordinate to the usage of the "stated objectives" like "Students who wish to do graduate work in mathematics should have adequate understanding of ..." Students who "wish to understand something" can clearly accomplish such an objective while subjecting themselves to either or neither of these approaches.)

Aside from this general distinction some other specifics might be considered.

Text I think the text is a pretty good one, but it might be considered a little bit advanced by some. As I mentioned, it pitches the subject at a significantly higher level than the one we use at my institution.

Material As discussed above, the selection of topics could be different, but the one included is reasonable. The most significant suggestion I could make here is that I think it would be extremely useful for students to be able to feed an ODE with initial conditions into a canned solver (like NDSolve in Mathematica or ODE45 in Matlab) and extract specific values or plot solutions. Aside from any numerics, this would be something worth including in this course.

My only other suggestion (also made above) is that perhaps more flexibility on selecting the topics would be a good thing. To expand on that, let me say simply that it could be argued that if one has a single course on ODE, covering series solutions is less important than knowing about nonlinear dynamics for systems. The opposite could be argued, and it really depends on what the student needs subsequently, which is of course impossible to predict.

Homework I think working homework problems is important to learning the subject and grading homework is helpful if it is possible to do so. Several of the syllabi indicated homework was not graded or did not even mention homework.

Tests It could be noted that the overwhelming content of the grading/provided course material is test based. And the overwhelming majority of test problems are of the form: "Find the solution of the following ODE." Word problems were a rare exception. Problems depending on vocabulary were uncommon. A possible secondary suggestion is that a

project or paper be incorporated. I'll simply note on this that two of the desired learner outcomes are
The student will:
1. Communicate mathematical concepts in writing.
3. Provide mathematical applications to physical sciences.

This course is a great place to do these things. For example, the students can take a large transparent tube with a hole in the bottom and graduate it (or put a hole in a graduated cylinder) and measure the draining time for water with a stop watch. Then they can write a report explaining how to use an ODE to model/predict the draining time. There are many simple experiments like this. Having them do one and explain it carefully can allow them to learn to write and model.

Peculiar comments One of the instructors included in the syllabus the recommendation that the students have a hole-punch which is "to be used relentlessly," as stated in The New York Times.

I've taught a course in ODEs many times, and I've even read The New York Times a time or two, but I have no idea how to interpret this recommendation.

Another instructor has a long list of rules and rituals associated with the course. In particular, seats are assigned for exams and "finding the right seat is part of the exam." The same instructor includes the following practice: When the instructor announces that the time is up, the student should stop writing immediately. Failing to stop writing will result in a zero for the test.

One wonders if these practices contribute to anything in the way of student achievement. Does the instructor have a control issue?

Finally, one syllabus includes the admonition concerning homework problems: All of these problems are for your own benefit, and will never be collected.

This must make students wonder: "For whose benefit are the graded portions of the course?"

I think there's a place for humor and cynicism, maybe even disdain sometimes, but we probably need to think in terms of the usefulness of including such things up front in the syllabus. At least it was my impression that some of these things could create an adversarial atmosphere between the instructor and the students. Maybe that is what is desired, but at least one should be aware of it.

Summary Overall, it looks to me like all of these six instructors are doing an excellent job teaching this fairly standard course, especially with respect to the stated objectives for the grading.

Sincerely,

John McCuan

UNDERGRADUATE ASSESSMENT PLAN FOR THE DEPARTMENT OF MATHEMATICS AND STATISTICS

The stated objectives are:

> "Students who wish to do graduate work in mathematics should have an adequate understanding of Advanced Calculus and Ordinary Differential Equations."
>
> "Students who wish to do graduate work in engineering or one of the mathematical sciences, should have an adequate understanding of Calculus, Ordinary Differential Equations, and Numerical Methods"
>
> "Students who wish to teach mathematics should have an adequate understanding of Advanced Calculus, Ordinary Differential Equations, and Statistics."

1. Assuming all went as planned and the students diligently completed the syllabus, assign a grade (A-F) to the syllabus indicating how well studying these topics would help students satisfy the objectives

1. A

2. Now look at the tests given and grade them (as a single entity) according to how well achieving good scores on them would indicate that students have satisfied the objective.

2. A

3. Finally, consider the graded examples of student work (again, as a single entity) and assign a grade indicating how well their performances demonstrate that students have satisfied the objective.

3. A

SIUE Undergraduate Assessment and Program Review

epartment of _Math, Stat, & Physics__________ 2013-14

rogram-initiated Goal of Objective	Where, When, and How Monitored	Expectation for Satisfactory Performance	Decision Point	Observations of Student Performance	When and By Whom Were Results Analyzed?	Outcome of Analysis	Dept. or Program Follow-up
To prepare students r graduate study in athematics or atistics. graduate study in gineering or other ysical sciences.	**Course work Math 555 (Differential Equations 1)**	**Grades and performance on final examination and other tests.**	**Grade of C or better in Math 555 completed and judged satisfactory by faculty members.**	How many students _**153**_exceeded _**47**_met _**36**_did not meet expectations? _**0**_exempted _**236**_Total	Dept. meeting date ________ or Individual analysis (describe)? Performed by external consultant **Prof. John McCuan of Georgia Tech.**	□ **Objective wholly satisfied** □ Objective not wholly satisfied. Follow-up strategy is ____________	**Not required** □ Follow-up completion on date ___________ □Will re-examine by date

ther Observations? None

Assessment Report on Math 571 by Professor Madan L. Puri
Email received on May 3, 2013

Dear Professor Sun:

First, I would like to express my sincere thanks for the invitation to visit your department to give a colloquium and to assess the course STAT 571 " Statistical Methods 1". The visit provided me an opportunity to meet the faculty of your department and to exchange ideas about some of the areas of mathematics. It turned out to be a very pleasant visit and I enjoyed every moment of my stay. Thanks again for the invitation.

Professor Chopra showed me the material he had prepared for this course which is a part of a two-semester sequence Stat 571-Stat 572. Stat 571 is a basic fundamental course in which the students learn the core material. The book used for this course is : Statistical Concepts and Methods by G.K.Bhattacharyya and R.A.Johnson.This is a well known book which provides an excellent account of the topics covered in Stat 571with many helpful excercises. Along with this book, Professor Chopra uses Schaum's outlines:Probability and Statistics, Second Edition by Spiegel, Schiller and Srinivasan to provide some supplementary material which has many interesting features highly useful for the students.

I was very impressed by the fact that before starting the course, Professor Chopra gets to know from each student about his/her background in mathematics and statistics which provides him highly useful information regarding the level at which he should teach.

Professor Chopra also showed me the homework assignments which I found well representative of the topics covered in the class, and which strengthens students' knowledge of the subject.I also saw the exams which Professor Chopra gave to the students; they were representative of the course taught and were fairly graded.

In summary, the course Stat 571 (along with Stat 572) has been thought out very carefully from the syllabus to the test to the grading of the exams.

I may also mention and some what confusing that two of the important topics,namely, Sample Surveys and Analysis of Catagorical Data covered in the class are not included in the university catalog.I would suggest this omission be taken care of.

I found out that the statistics courses at your university are also offered in some other departments. It would be more efficient if at least all the introductory courses are covered in the department of mathematics and statistics as is the case in most of the universities in USA.

Sincerely,

Madan L. Puri
College of Arts & Sciences Distinguished Research Scholar
&
Emeritus Professor of Mathematics
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UNDERGRADUATE ASSESSMENT PLAN
FOR THE DEPARTMENT OF MATHEMATICS AND STATISTICS

The stated objectives are:

> "Students who wish to teach mathematics should have an adequate understanding of Advanced Calculus, Ordinary Differential Equations, and Statistics."
>
> "Students who wish to pursue a career in business or industry should possess knowledge of diverse statistical techniques."

1. Assuming all went as planned and the students diligently completed the syllabus, assign a grade (A-F) to the syllabus indicating how well studying these topics would help students satisfy the objectives

1. ✓

2. Now look at the tests given and grade them (as a single entity) according to how well achieving good scores on them would indicate that students have satisfied the objective.

2. ✓

3. Finally, consider the graded examples of student work (again, as a single entity) and assign a grade indicating how well their performances demonstrate that students have satisfied the objective.

3. ✓

epartment of _Math, Stat, & Physics__________ 2012-13

rogram-initiated Goal of Objective	Where, When, and How Monitored	Expectation for Satisfactory Performance	Decision Point	Observations of Student Performance	When and By Whom Were Results Analyzed?	Outcome of Analysis	Dept. or Program Follow-up
udents should have n adequate nderstanding of verse statistical chniques.	**Course work Stat 571** (Statistical Metheds)	**Grades and performance on final examination and other tests.**	**Grade of C or better in Stat 571 completed and judged satisfactory by faculty members.**	How many students _15_exceeded _0_met _0_did not meet expectations? _0_exempted _15_Total	Dept. meeting date ________ or Individual analysis (describe)? Performed by external consultant Prof. Madan Puri of Indiana University.	□ **Objective wholly satisfied** □ Objective not wholly satisfied. Follow-up strategy is ___________ ___________ ___________	**Not required** □ Follow-up completion on date ___________ □Will re-examine by date

ther Observations? None

STONY BROOK
STATE UNIVERSITY OF NEW YORK

Department of Applied Mathematics And Statistics

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March 16, 2012

Professor Ziqi Sun
Department of Mathematics, Statistics, and Physics
Wichita State University
1845 N. Fairmount
Wichita, KS 67260

Dear Professor Sun,

Thank you for the opportunity to visit your department and to evaluate the content of your course MATH 551, Numerical Methods. I carefully reviewed the syllabus, copies of the tests, samples of the graded midterm, and graded final exams. I also had long discussions with your colleague Prof. Tianshi Lu, who teaches MATH 551. My impression of the course is very positive.

Numerical Methods are critical for any student pursuing a career or graduate study in engineering or mathematical sciences, as these methods are the foundation of almost all the computational work in these areas. MATH 551 is designed to covers a number of important numerical methods, including solutions of linear and nonlinear equations, least squares problems, interpolation, quadrature, and numerical solutions of ordinary differential equations. These are also the core material taught in many other universities, including Stony Brook University. One potential topic for your consideration in the course, if time permits, is the computation of eigenvalues and eigenvectors of matrices, but it is optional since this topic is relatively more advanced, and the concepts of eigenvalues are covered in other course such as MATH 511.

The course uses the textbook "Numerical Computing with MATLAB" by Cleve B. Moler. Dr. Moler is the inventor of MATLAB and a highly regarded numerical analyst. His textbook is well written and well suited for undergraduate students. The book is also very comprehensive, including all the topics of the course, plus additional advanced topics such as the computation of eigenvalues and eigenvectors, Fourier transform, and solutions of partial differential equations. So it can also serve as a reference book for the students in the future. MATLAB is also very appropriate for teaching numerical methods, because the students can easily perform various numerical experiments to understand the accuracy and stability of different methods, instead of being overwhelmed by the details of the algorithms. One disadvantage of this textbook is that it sometimes does not cover enough details of the algorithms. However, Prof. Tianshi Lu does an excellent job by supplementing the textbook with additional materials on topics such as Lagrange interpolation, Chebyshev points, quadrature rules, least squares, etc. Therefore, I believe if students study diligently for the course, they will have adequate understanding of basic numerical methods used in science and engineering.

I also reviewed the exam papers of the course as well as the grade distribution of the course. The final exam did not seem easy to me. It included computational questions as well as conceptual and analytical questions such as analyzing the order of accuracy. In my experience, undergraduate students tend to have difficulties with the latter. Despite the difficulties, a number of students obtained nearly perfect score. This demonstrates that many students understood the methods and grasped the concepts very well, and they have learned a lot from the course. The overall grade distribution of the course is very reasonable, with an average between 75 and 83 on the exams. These grades seem to be proper reflections of their mastering of the knowledge from the course.

Overall, I think MATH 551 is well designed and well taught. It covers the important concepts and methods in numerical analysis, and serves its purpose of preparing the students for their future graduate study or practical work in engineering and mathematical sciences. I congratulate the excellent efforts of your colleagues on the course, and wish you continued success in educating the students in your university.

Sincerely yours,

Xiangmin (Jim) Jiao

Associate Professor
Department of Applied Mathematics and Statistics

UNDERGRADUATE ASSESSMENT PLAN
FOR THE DEPARTMENT OF MATHEMATICS AND STATISTICS

The stated objectives is:

> "Students who wish to do graduate work in engineering or one of the mathematical sciences, should have an adequate understanding of Calculus, Ordinary Differential Equations, and Numerical Methods"

1. Assuming all went as planned and the students diligently completed the syllabus, assign a grade (A-F) to the syllabus indicating how well studying these topics would help students satisfy the objectives

1. A

2. Now look at the tests given and grade them (as a single entity) according to how well achieving good scores on them would indicate that students have satisfied the objective.

2. A

3. Finally, consider the graded examples of student work (again, as a single entity) and assign a grade indicating how well their performances demonstrate that students have satisfied the objective.

3. A

SIUE Undergraduate Assessment and Program Review

Department of _Math, Stat, & Physics____________ 2011-12

Program-initiated Goal of Objective	Where, When, and How Monitored	Expectation for Satisfactory Performance	Decision Point	Observations of Student Performance	When and By Whom Were Results Analyzed?	Outcome of Analysis	Dept. or Program Follow-up
Goal 3 of the Undergraduate Assessment Plan in the area of Numerical Methods: "Students who wish to do graduate work in engineering or one of the mathematical sciences, should have an adequate understanding of Calculus, Ordinary Differential Equations, and Numerical Methods."	**Course work Math 551 (Numerical Methods)**	**Grades and performance on final examination and other tests.**	**Grade of C or better in Math 551 completed and judged satisfactory by faculty members.**	How many students _17_exceeded _4_met _1_did not meet expectations? _0_exempted _22_Total	Dept. meeting date ________ or Individual analysis (describe)? Performed by external consultant Prof. Xiangmin Jiao of the State University of New York at Stony Brook.	□ **Objective wholly satisfied** □ Objective not wholly satisfied. Follow-up strategy is ________ ________ ________	**Not required** □ Follow-up completion on date ________ □Will re-examine by date

Other Observations? None

NJIT
New Jersey Institute of Technology
COLLEGE OF SCIENCE & LIBERAL ARTS

New Jersey Institute of Technology
Department of Mathematical Sciences
University Heights
Newark, NJ 07102-1982

Denis Blackmore

10 April 2011

Professor Ziqi Sun
Department of Mathematics and Statistics
Wichita State University
Wichita, Kansas 67260, USA

Dear Professor Sun:

First let me express my thanks for the invitation to visit your department and to review the courses that I have evaluated in the sequel. Undertaking the course reviews along with the more traditional invitation to present a talk on my research in your Lecture Series made for a unique and interesting experience, rendered all the more enjoyable by the hospitality and amicability of you and your faculty colleagues.

The courses I was asked to review are Math 415, (Introduction to Advanced Mathematics) and Math 547 (Advanced Calculus I) as they were by taught by two instructors in the spring and fall of 2010. I was given ample data on which to base my evaluations, including course descriptions and textbooks, syllabi, graded exams and submitted homework solutions, final grades and student evaluations. Additional conversations with the instructors and other faculty members also served to enhance my knowledge of the course histories and dynamics, along with the nature of the students in each of the courses. All in all, I would say that you and your colleagues were kind enough to provide more than enough information for me to make a well-informed evaluation of the quality, degree of success and efficacy of these course offerings.

Math 415 is intended as a course in the fundamentals of mathematics – with an emphasis on developing proficiency in rendering proofs – designed to prepare students of mathematics for the more rigorous courses, such as advanced calculus that they must master if they hope to become mathematical researchers or mathematics teachers at the secondary level. The textbooks used, *Proofs and Fundamentals*, by E. Bloch, and *Mathematical Proofs*, 2nd ed., by G. Chartrand *et al.*, both contain the same basic core material, which includes some informal logic (set theory, the propositional calculus, and a bit of quantification theory), a description of direct and indirect proof strategies, principles of induction, some number theory, and a glimpse of cardinality theory. Both books are well-suited to the syllabus and goals of Math 415, but I prefer the second text because it also treats $\varepsilon - \delta$ and $\varepsilon - N$ proofs, which are ubiquitous in advanced calculus; the course, I believe, for which Math 415 is designed to serve as a fundamental preparatory experience.

Just as good writers must first learn the basics of the language (grammar), study the work of professionals, practice by writing compositions and short stories that are critiqued by experts, then immerse themselves in the masters, and ultimately find their own voice; success in mathematics requires mastery of the fundamentals of mathematical logic and proof writing, taking ever more advanced courses in which one's work is perused and corrected by experts, and studying the work of the masters as one matures mathematically. Math 415 is designed to fulfill the initial requirements of this mathematical journey, and as far as I can tell it succeeds admirably.

The instructors employed somewhat different styles, but both meticulously corrected many homework problems and several tests including a final examination – all of which very effectively measured the students' knowledge of the course material and provided excellent preparation for the increasing rigors of more advanced mathematics courses. Near the end of the courses, the tests and homework showed that the best students were very proficient in crafting fairly complicated proofs of moderate length. But what impressed me more was the fact that even the weakest students showed much improved skills in proof rendering and the middle level students had made significant strides in their ability to prove some rather substantial results with acceptable rigor. In sum, the instructors did an outstanding job in teaching the course – which is well conceived to meet the envisaged goals of preparing students for more advanced studies in mathematics, science and even engineering. All of the students learned a good deal from these courses and their instructors as is clearly borne out by the excellent overall distributions in the final grades and the very good student evaluations received by the professors.

The same two professors who taught Math 415 in the spring and fall of 2010 also taught Math 457 (Advanced Calculus I) in the fall and spring of 2010, respectively, and also achieved excellent results. Math 457 is a traditional course in advanced calculus of real-valued functions of a single real variable, with the usual staple of topics: These are the treatment of the real numbers as a complete ordered field, followed by rigorous descriptions of limits, continuity, differentiability, Riemann integration, sequences and infinite series, with a sprinkling of topology. In one case, the instructor also included a prevue of multivariable advanced calculus, which is what I like to do when I teach the equivalent of this course at NJIT, since several of the concepts and results generalize so naturally to higher dimensions. One instructor used *Elementary Analysis: The Theory of Calculus*, by K. Ross, and the other chose the classic text *The Elements of Real Analysis,* by R. Bartle. Both of these textbooks are challenging and very well suited for the course.

These instructors, just as in Math 415, assigned many homework problems, which they painstakingly graded – with helpful comments. They also gave tests and examinations that were well designed to gauge the students' mastery of the material. It is clear from the student evaluations that their efforts were greatly appreciated by their classes, and this is also reflected in the strong positive skewing of the final grade distributions. One of the instructors also provided some excellent supplementary notes to help the students. Obviously, both instructors invested a great deal of time and effort in creating an effective learning environment for their students – and this yielded significant dividends. Once again I was strongly impressed by the performance of the best students on homework and exams and especially by the absorption of course concepts and methods of analysis evinced by the weaker students. Obviously, both instructors did outstanding work in teaching these courses.

In summary, both of these courses and instructors were very successful in almost all aspects. There can be little doubt concerning the excellence of the design, presentation and relevance of these courses, and I believe that all who have or shall take these courses are bound to benefit greatly from the experience. To put it simply, my only real advice for these courses is to keep up the very good work.

Sincerely yours,

Denis Blackmore

Denis Blackmore
Professor of Mathematical Sciences
Tel: 973-596-3495
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UNDERGRADUATE ASSESSMENT PLAN
FOR THE DEPARTMENT OF MATHEMATICS AND STATISTICS

The stated objectives are:

> "Students majoring in mathematics should possess a common core of mathematical skills, leading to a better understanding of mathematical reasoning."
>
> "Students who wish to do graduate work in mathematics should have an adequate understanding of Advanced Calculus and Ordinary Differential Equations."
>
> "Students who wish to teach mathematics should have an adequate understanding of Advanced Calculus, Ordinary Differential Equations and Statistics."

1. Assuming all went as planned and the students dutifully completed the syllabus, assign a grade (A-F) to the syllabus indicating how well studying these topics would help students satisfy the objectives.

1. A

2. Now look at the tests given and grade them (as a single entity) according to how well achieving good scores on them would indicate that students have satisfied the objective.

2. A

3. Finally, consider the graded examples of student work (again, as a single entity) and assign a grade indicating how well their performances demonstrate that the students have satisfied the objective.

3. A

SIUE Undergraduate Assessment and Program Review

)epartment of _Math & Stat________ 2010-11

Program-initiated Goal of Objective	Where, When, and How Monitored	Expectation for Satisfactory Performance	Decision Point	Observations of Student Performance	When and By Whom Were Results Analyzed?	Outcome of Analysis	Dept. or Program Follow-up
ioal 1, 2, and 4 of ne Undergraduate ssessment Plan in ne area of Advanced alculus: Students hould possess a ommon core of nathematical skills, eading to a better nderstanding of nathematical easoning.	**Course work Math 415 (Introduction to Advanced Mathematics) and Math 547 (Advanced Calculus I)**	**Grades and performance on final examination and other tests.**	**Grade of C or better in Math 415 and Math 547 completed and judged satisfactory by faculty members.**	How many students _58_exceeded _7_met _10_did not meet expectations? _0_exempted _75_Total	Dept. meeting date ________ or Individual analysis (describe)? Performed by external consultant Prof. Denis Blackmore of New Jersay Institute of Technology.	□ **Objective wholly satisfied** □ Objective not wholly satisfied. Follow-up strategy is ________ ________ ________	**Not required** □ Follow-up completion on date ________ □Will re-examine by date

ther Observations? None

1b. UNDERGRADUATE ASSESSMENT PLAN

Department: Mathematics, Statistics, Physics

Program: Physics (BS)

I. Program Mission

The mission of the undergraduate program in Physics is to provide a broadly based, flexible degree program in undergraduate level physics and also to provide the Physics instruction needed by programs in other sciences, engineering, education, and health professions, as well as in the liberal arts.

II. Program Goals

- To provide students with a high quality program of undergraduate study in Physics.

- To prepare students for graduate study in physics or a related discipline or for physics-related employment in academic, industrial, or governmental positions.

III. Learner Outcomes

Students will demonstrate and apply knowledge of the following core areas in Physics:

6. Mechanics
7. Electricity-Magnetism
8. Optics
9. Thermodynamics
10. Quantum Mechanics
11. Relativity
12. Advanced Lab

IV. Assessment of Learner Outcomes

Physics majors will be assessed in their final year before graduation with the Sigma Pi Sigma (the USA National Physics fraternity) entrance test, which is a comprehensive test evaluating the knowledge of students in the areas listed above. Using this standardized test learner outcomes for our students will be assessed at the national level. A comparison to other schools and their students will be known.

7. **Assessment Target**

Our overall goal is to maintain a 50% or higher acceptance rate for membership into Sigma Pi Sigma. (NOTE: In 2012 we graduated 7 Physics majors. They took the SPS exam and 6 were admitted into Sigma Pi Sigma). This acceptance rate will be recorded on an annual basis.

VI. Feedback Loop Used by the Faculty

Every few years our performance will be evaluated by the Physics faculty to assure that we are maintaining high learner standards in Physics and course content and the amount of time students spend studying specific subject in Physics via credit hours will be evaluated to make any adjustments to assure the best possible performance of our students. We feel that we can then best serve our students and the many employment job opportunities they get or prepare the students for further studies in graduate school through this evaluation procedure.

(old) Physics Department* Undergraduate Assessment Plan

University Mission

Wichita State University is committed to providing comprehensive educational opportunities in an urban setting. Through teaching, scholarship, and public service, the University seeks to equip both students and the larger community with the educational and cultural tools they need to thrive in a complex world, and to achieve both individual responsibility in their own lives and effective citizenship in the local, national, and global community.

High quality teaching and learning are fundamental goals in all undergraduate, graduate, and continuing education programs. Building on a strong tradition in the arts and science, the University offers programs in business, education, engineering, fine arts, and health professions, as well as in the liberal arts and sciences. Wichita State has 113 degree programs that range from the associate to the doctoral level; non-degree programs are designed to meet the specialized educational and training needs of individuals and organizations in south central Kansas.

Scholarship, including research, creative activity, and artistic performance, is designed to advance the University's goals of providing high quality instruction, making original contributions to knowledge and human understanding, and serving as an agent of community service. This activity is a basic expectation of all faculty members at Wichita State University.

Public and community service activities seek to foster the cultural, economic, and social development of a diverse metropolitan community and of the state of Kansas. The University's service constituency includes artistic and cultural agencies, business and industry, and community educational, governmental, health, and labor organizations. Wichita State University pursues its mission utilizing the human diversity of Wichita, the state's largest metropolitan community, and its many cultural, economic, and social resources. The University faculty and professional staff are committed to the highest ideals of teaching, scholarship, and public service, as the University strives to be a comprehensive, metropolitan university of national stature.

Program Mission

The mission of Wichita State University is not merely that of a trade school, but to provide "comprehensive" education. A good university education teaches students to think critically, and to use the wisdom of the past to understand the present and to develop a vision for the future. Physics is an essential part of this goal. Physics can be defined as the attempt to understand the behavior of matter and energy in terms of a few general laws or principles. Physicists try to understand the cosmos, all the way from stars and galaxies down to the elementary particles that make up nuclei and atoms. The laws

* In 2008, 2009 and 2010 there was an independent department of Physics.

(Old assessment)

of physics underlie the electronic intricacies of computers as well as the biological complexities of the human brain. Understanding the cosmos and the human brain are perhaps the boldest goals of 21st century physics, but of course there are also more down-to-earth problems being tackled by physicists today. In fact, the creative processes used in physics – the logic, the discipline, the approach to analyzing the single tree without being overwhelmed by the forest – also have important applications in many other areas if not in all.

Physics is the fundamental science and forms the core of every discipline in one way or another. The physics department provides the following service courses to the general education program of the university and for the science, health professions, and engineering majors: Physics 111, 131, 195, 213, 214, 313, 314, 315, 316, 320, and 395.

For Physics majors we offer two Bachelor's degrees, the BA and the BS. In addition to the basic courses which are a part of every physics major's preparation, we take pride in offering our students unique opportunities to be involved in fundamental original research as a significant part of their degrees. Physics degrees from WSU prepare our students with the tools necessary either to carry on their education in graduate studies or to seek careers in industry, government service or education. WSU Physics graduates are currently well employed in industry as engineers, in software development companies, and in the teaching profession as educators.

As part of the University's goal of making original contributions to knowledge and human understanding, the Physics Department faculty are expected to have nationally competitive research programs, seek external funding, and attend national and international conferences.

The department as a significant part of the metropolitan advantage takes pride in serving the community and region via public education activities such as presentations and speeches. Lake Afton Public Observatory and the Fairmount Center of Science and Mathematics Education were both started and nurtured in our department. Every year our faculty members play a disproportionately large role in Science Olympiad and the Kansas Junior Academy of Science, and we are proud to do so. More recently we have been collaborating significantly with the College of Education as well.

Program Goals and Objectives

1. To provide high quality introductory physics courses for other program's majors, and for WSU's general education program.
2. To provide high quality instruction, a solid undergraduate program, and research mentoring for physics majors.
3. To produce high quality fundamental physics research, as measured by published articles and books, presentations, and external funding; involvement in current areas of physics and collaborations with researchers in other fields and at other institutions; and national and international recognition.
4. To engage in educational outreach.

(old assessment)

Learner Outcomes

Students who have taken introductory physics courses from WSU should be a) well prepared for the next course, if taking another physics course; b) well-prepared in the physics background they need to succeed in their chosen major, if not taking another physics course; and c) well-grounded in the basic understanding that physics provides of the universe as a whole. Students graduating with a physics degree from WSU should be well-prepared for graduate school, professional school, or for entering the work force, based on their knowledge of physics and their technical skills in problem solving, modeling, computers, and electronics.

Assessment of Program Goals

1. Scientific productivity: number of articles, quality of articles, number of presentations, quality of venues, number of citations, quality of citations.
2. Number of external and internal grants and dollar amount of grants.
3. Number and breadth of collaborations, number and quality of external invitations for talks, panel service, grant refereeing, paper refereeing.
4. Number, size, and quality of educational outreach activities.

Assessment of Learner Outcomes

Introductory Courses:
The Physics Department plans to integrate its assessment plan into the fabric of our larger goals as a department. We are primarily a service department: Most of our credit hours, and a majority of our faculty's time, is spent in teaching majors from other departments. Our work is none the less vital for that fact, however. Instruction in physics is fundamental for all of engineering, physical and life sciences. Accrediting agencies from ABET to ACS all require that students learn the basics, which in most cases requires a year of introductory physics at either the algebra or the calculus level. The Physics Department therefore offers Physics 213-214 and Physics 313-314-315-316 for the two respective levels. Each sequence is a total of 10 credit hours, including labs. The first semester (213 or 313-315) covers classical mechanics, heat, and wave motion; the second (214 or 314-316) covers electricity, magnetism, and light. In addition, 214 covers the small amount of modern physics that life sciences students need (especially to pass the MCAT.)

One of the major problems we (like most physics departments) face is a very high dropout rate in these basic courses. We have tried to address this problem in two ways: we have created a second-half-of-the-semester course, Physics 151, for students who find that their preparation is less than adequate; and we have instituted a Physics Help Lab (at the moment inadequately staffed by volunteers) to assist students having trouble. Unfortunately both are underutilized. Professors estimate that something like a third of the students enrolling in 213 or 313 (amounting to dozens in total) are underprepared, but

(old assessment)

enrollment in 151 this semester was only 3. Many are probably deciding to take the easier course at a community college, which experience teaches will probably only set them up for failure in the next course. But even if they did all enroll in 151 after dropping out of 213 or 313, it would be much better if we could direct him/her to the correct course in the first place.

We therefore propose that we set up a system similar to that the Mathematics Department has followed for years: a placement examination to determine the readiness of students for entering 213 or 313, and an exit exam for each course which can also serve as a placement exam for 214 or 314. Students demonstrating insufficient preparation for 213 or 313 could be directed to take the preparatory problem-solving course, 151, or the conceptual physics course, 111. Students with low but passing scores would be forewarned that their preparation was somewhat weak, and would know ahead of time to expect to have to work harder or to need Help Lab assistance.

In addition to going a long way towards solving our dropout problem, these exams can also serve the purpose of assessment – of the bulk, if not the whole, of our program. Collecting the data over only a couple of semesters will give us respectable numbers, enough for reliable statistics. One suggestion has been to use a nationally available, and normed, qualitative test (like Force Concept Inventory) for the conceptual physics part of the placement exam; this would have the advantage that we could then compare our results with those from physics departments across the country. In addition, by comparing averages for exit exams of large sections taught by different methods we could also objectively evaluate those methods' efficacy.

A committee of four faculty members (Drs. Axmann, Behrman (chair), Ferguson (undergraduate coordinator), and Foster) has been set up to construct the five examinations (placement, 213 exit, 313 exit, 214 exit, and 314 exit.) We hope to have these worked out and ready for Fall Semester, 2005. For Spring Semester 2005 we will gather preliminary data using the Force Concept Inventory as pre- and post-test for 111, and as pre-test for both 213 and 313 classes; for post-tests we plan to use (part of) the AP Physics tests at the appropriate levels.

Upper Division Courses:

The major as a whole also needs to be objectively evaluated. The major difficulty here is that we have so few majors – only a handful graduate every year – that it will take many years before statistics of any worth can be generated. However that is no reason not to start. We propose that graduating seniors take the Graduate Record Exam in Physics. This is a well-known, respected, and nationally normed examination that covers the entire undergraduate physics curriculum. There are parts of the exam that cover subjects a small department like ours cannot teach, like elementary particles or general relativity; however, these sections are small and in analyzing the results we can make allowances for these omissions.

Unfortunately this exam does cost almost $200 to take, and this may well be an expense

(old assessment)

many who were not planning on going to graduate school immediately cannot afford. If we cannot find the money to cover this for our students we can construct a number of similar exams from preparation books, and administer it ourselves.

Results

See the following tables for 2008, 2009 and 2010.

Feedback Loop

Since this process is new to us, we have not yet finalized either the assessment instrument or its method or standards of analysis. For the coming semester we will administer, as both pre- and post-test for 111, and as pre-test for the 200 and 300 level, the Force Concept Inventory. Our committee will construct preliminary versions of the post-tests for the 200- and 300-level courses from AP Physics tests. In May of 2005 we will meet as a faculty to discuss the results. Our analysis will provide important data for the committee of four, which will have been working on the design of the five examinations and the databases we will need for their administration. It will also, we hope, provide us with important information about how we can better teach our courses.[1]

1 [1]Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. American Journal of Physics, 66, 64-74.

Can be accessed from:
http://scitation.aip.org/dbt/dbt.jsp?KEY=AJPIAS&Volume=66&Issue=1

Department of ___ Physics

Program-initiated Goal of Objective	Where, When, and How Monitored	Expectation for Satisfactory Performance	Decision Point	Observations of Student Performance	When and By Whom Were Results Analyzed?	Outcome of Analysis	Dept. or Program Follow-up
Physics 111 students will demonstrate significant learning of conceptual	***Pre- and post-testing using Force Concept Inventory***	***Performance on nationally normed exam***	***Each student demonstrates a gain g = (posttest-pretest)/(100-pretest) of at least 0.3 and/or final***	_How many students _3 students exceeded _21 meet and _14 did not meet	Dept. meeting date __ or Individual analysis (describe)? Based on previous report	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement	None required □ Follow-up completion on date ________ xWill re-examine by date end of fall
Physics 213 students will demonstrate significant learning of algebra-level mechanics, heat, and waves	***AP level B Physics exam (half of it)***	***Performance on nationally normed exam***	***Each student scores at least 40%, and students earning an A score at least 60%.***	_How many students _22_ exceeded _58_met _107_did not meet expectations? 62__exempted 187_Total	Dept. meeting date ___ or Individual analysis (describe)? Based on previous report	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods, to introduce a math placement test , and to begin to	None required □ Follow-up completion on date ________ xWill re-examine by end of fall semester and each semester thereafter
Physics 214 students will demonstrate significant learning of algebra-level electricity, magetism, llight, and modern	***AP level B Physics exam (the other half of it)***	***Performance on nationally normed exam***	***Each student scores at least 40%, and students earning an A score at least 60%.***	How many students _20_ exceeded _43_met _114_did not meet expectations? 0__exempted _177_Total	Dept. meeting date ___ or Individual analysis (describe)? Based on previous report	Objective satisfaction unknown at this point. No students took the test.	None required □ Follow-up completion on date ________ xWill examine by end of fall semester and each semester thereafter
Physics 313 students will demonstrate significant learning of calculus-level mechanics, heat, and wave motion	***AP level C Mechanics exam***	***Performance on nationally normed exam***	***Each student scores at least 40%, and students earning an A score at least 60%.***	How many students _16_ exceeded _46_met _87_did not meet expectations? 2__exempted _149_Total	Dept. meeting date ___ or Individual analysis (describe)? Based on previous report	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods and to introduce a math placement test.	None required □ Follow-up completion on date ________ xWill re-examine by end of fall semester and each semester thereafter
Physics 314 students will demonstrate significant learning of calculus-level electricity, magnetism, and light	***AP level C Electricity and Magnetism exam***	***Performance on nationally normed exam***	***Each student scores at least 40%, and students earning an A score at least 60%.***	How many students _15_ exceeded _33_met _80_did not meet expectations? 18__exempted _128_Total	Dept. meeting date ___ or Individual analysis (describe)? Based on previous report	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods and to introduce a math placement test.	None required □ Follow-up completion on date ________ xWill re-examine by end of fall semester and each semester thereafter
Graduating seniors in Physics will demonstrate significant learning of the standard Physics curriculum	***Graduate Record Examination in Physics***	***Performance on nationally normed exam***	***Each student scores at least 50%***	How many students _0_ exceeded _0_met _0_did not meet expectations? _1_exempted _1_Total	Undergraduate advisor is accumulating data on averages in each subfield	Objective satisfaction unknown at this point. Follow-up strategy is to ensure curriculum in each advanced class covers essentials, and to introduce a problem-solving	None required □ Follow-up completion on date ________ xWill examine each student as s/he graduates

Department of Physics

Program-initiated Goal of Objective	Where, When, and How Monitored	Expectation for Satisfactory Performance	Decision Point	Observations of Student Performance	When and By Whom Were Results Analyzed?	Outcome of Analysis	Dept. or Program Follow-up
Physics 111 students will demonstrate significant learning of conceptual physics	**Pre- and post-testing using Force Concept Inventory**	**Performance on nationally normed exam**	**Each student demonstrates a gain g = (posttest-pretest)/(100-pretest) of at least 0.3 and/or final performance of 60% or better.**	How many students_ exceeded _3_ met __ did not meet 7 expectations? 0__exempted _10_Total	Dept. meeting date ___ or Individual analysis (describe)? ________ ________ ________	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods in 111 course	None required □ Follow-up completion on date ________ xWill re-examine by date end of fall semester and each semester thereafter
Physics 213 students will demonstrate significant learning of algebra-level mechanics, heat, and waves	**AP level B Physics exam (half of it)**	**Performance on nationally normed exam**	**Each student scores at least 40%, and students earning an A score at least 60%.**	How many students _49_ exceeded _83_met 170_did not meet expectations? _12_exempted _302_Total	Dept. meeting date ___ or Individual analysis (describe)? ________ ________ ________	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods, to introduce a math placement test , and to begin to standardize curricula.	None required □ Follow-up completion on date ________ xWill re-examine by end of fall semester and each semester thereafter
Physics 214 students will demonstrate significant learning of algebra-level electricity, magetism, llight,	**AP level B Physics exam (the other half of it)**	**Performance on nationally normed exam**	**Each student scores at least 40%, and students earning an A score at least 60%.**	How many students _24_ exceeded _56_met 78_did not meet expectations? _8_exempted 158_Total	Dept. meeting date ___ or Individual analysis (describe)? ________ ________ ________	Objective satisfaction unknown at this point. No students took the test.	None required □ Follow-up completion on date ________ xWill examine by end of fall semester and each semester thereafter
Physics 313 students will demonstrate significant learning of calculus-level mechanics, heat, and wave motion	**AP level C Mechanics exam**	**Performance on nationally normed exam**	**Each student scores at least 40%, and students earning an A score at least 60%.**	How many students 5_ exceeded _16 met 132_did not meet expectations? _15_exempted _153_Total	Dept. meeting date __ or Individual analysis (describe)? ________ ________ ________	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods and to introduce a math placement test.	None required □ Follow-up completion on date ________ xWill re-examine by end of fall semester and each semester thereafter
Physics 314 students will demonstrate significant learning of calculus-level electricity, magnetism, and	**AP level C Electricity and Magnetism exam**	**Performance on nationally normed exam**	**Each student scores at least 40%, and students earning an A score at least 60%.**	How many students _3_ exceeded 24_met 129_did not meet expectations? _10_exempted 156_Total	Dept. meeting date ___ or Individual analysis (describe)? ________ ________ ________	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods and to introduce a math placement test.	None required □ Follow-up completion on date ________ xWill re-examine by end of fall semester and each semester thereafter
Graduating seniors in Physics will demonstrate significant learning of the standard Physics curriculum	**Graduate Record Examination in Physics**	**Performance on nationally normed exam**	**Each student scores at least 50%**	How many students __ exceeded __met __did not meet expectations? __exempted _2_Total	Undergraduate advisor is accumulating data on averages in each subfield	Objective satisfaction unknown at this point. Follow-up strategy is to ensure curriculum in each advanced class covers essentials, and to introduce a problem-solving course.	None required □ Follow-up completion on date ________ xWill examine each student as s/he graduates

SIUE Undergraduate Assessment and Program Review 2014

Department of ___Physics______________________________

Program-initiated Goal of Objective	Where, When, and How Monitored	Expectation for Satisfactory Performance	Decision Point	Observations of Student Performance	When and By Whom Were Results Analyzed?	Outcome of Analysis	Dept. or Program Follow-up
Physics 111 students will demonstrate significant learning of conceptual physics	**Pre- and post-testing using Force Concept Inventory**	**Performance on nationally normed exam**	**Each student demonstrates a gain g = (posttest-pretest)/(100-pretest) of at least 0.3 and/or final performance of 60% or better.**	How many students_ exceeded _7_ met _16_ did not meet 1 expectations? 0__exempted _24_Total	Dept. meeting date x or Individual analysis (describe)? ________ ________ ________	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods in 111 course	None required □ Follow-up completion on date ________ xWill re-examine by date end of fall semester and each semester thereafter
Physics 213 students will demonstrate significant learning of algebra-level mechanics, heat, and waves	**AP level B Physics exam (half of it)**	**Performance on nationally normed exam 43.507%**	**Each student scores at least 40%, and students earning an A score at least 60%. 40% = 80 60% = 13**	_How many students _45_ exceeded _65_met 133_did not meet expectations? _9_exempted _243_Total	Dept. meeting date x or Individual analysis (describe)? ________ ________ ________	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods, to introduce a math placement test , and	None required □ Follow-up completion on date ________ xWill re-examine by end of fall semester and each semester thereafter
Physics 214 students will demonstrate significant learning of algebra-level electricity, magetism, llight, and modern physics	**AP level B Physics exam (the other half of it)**	**Performance on nationally normed exam 41.233%**	**Each student scores at least 40%, and students earning an A score at least 60%. 40% = 107, 60% = 15**	How many students _26_ exceeded 81_met _96_did not meet expectations? _0_exempted _203_Total	Dept. meeting date x or Individual analysis (describe)? ________ ________ ________	Objective satisfaction unknown at this point. No students took the test.	None required □ Follow-up completion on date ________ xWill examine by end of fall semester and each semester thereafter
Physics 313 students will demonstrate significant learning of calculus-level mechanics, heat, and wave motion	**AP level C Mechanics exam**	**Performance on nationally normed exam 30.317%**	**Each student scores at least 40%, and students earning an A score at least 60%. 40% =92, 60% = 8**	How many students 21_ exceeded _70_met _269_did not meet expectations? _34_exempted _360_Total	Dept. meeting date ___ or Individual analysis (describe)? ________ ________ ________	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods and to introduce a math placement test.	None required □ Follow-up completion on date ________ xWill re-examine by end of fall semester and each semester thereafter
Physics 314 students will demonstrate significant learning of calculus-level electricity, magnetism, and light	**AP level C Electricity and Magnetism exam**	**Performance on nationally normed exam 37.428%**	**Each student scores at least 40%, and students earning an A score at least 60%. 40% = 109, 60% = 14**	How many students 33_ exceeded _76_met 146_did not meet expectations? 5_exempted _255_Total	Dept. meeting date x or Individual analysis (describe)? ________ ________ ________	Objective not wholly satisfied. Follow-up strategy is to introduce interactive engagement methods and to introduce a math placement test.	None required □ Follow-up completion on date ________ xWill re-examine by end of fall semester and each semester thereafter
Graduating seniors in Physics will demonstrate significant learning of the standard Physics curriculum	**Graduate Record Examination in Physics**	**Performance on nationally normed exam**	**Each student scores at least 50%**	How many students __ exceeded __met __did not meet expectations? __exempted __Total	Undergraduate advisor is accumulating data on averages in each subfield	Objective satisfaction unknown at this point. Follow-up strategy is to ensure curriculum in each advanced class covers essentials,	None required □ Follow-up completion on date ________ xWill examine each student as s/he graduates

1c. GRADUATE PROGRAM ASSESSMENT PLAN

Department : Mathematics, Statistics, Physics

Program Name: Mathematics (M.S.)

Contact person: Kenneth Miller, ext 3959, miller@math.wichita.edu

Date of revision: June 12, 2012

I. Program Mission:

The mission of the M.S. program in Mathematics is to provide a broadly based, flexible program in graduate level mathematics and statistics which will prepare students either for doctoral study in mathematics and statistics; or for mathematics-statistics related employment in academic, industrial or governmental positions.

II. Program Constituents:

The students in the M. S. Degree program in Mathematics are the program constituents.

III. Program Objectives:

1. To provide students with a program of study in which they build on the knowledge acquired in an undergraduate program in mathematics and statistics by taking more advanced course work (and optionally research work) in certain areas of mathematics and/or statistics.

2. To prepare its graduates for either
   - further study in mathematics and statistics at the PhD level,
   - a career in teaching at the high school or junior college level,
   - a career in science, industry or government that requires graduate level training in mathematics or statistics.

IV. Assessment of Program Objectives:

1. This objective is assessed through the learner outcomes given below.

2. We maintain files containing information concerning what each graduate does upon graduation: employment obtained or further education pursued. The MS program expects at least 85% of the graduates of the program to obtain mathematics-statistics related employment or admission to a doctoral program within one year of graduation.

V. (Student) Learner Outcomes:

1. The student should acquire knowledge of mathematical and statistical theory and methods taught in at least 8 graduate courses (24 credit hours) at the 700 level or above in Mathematics or Statistics. Students have flexibility in choosing which areas to learn, but must maintain a 3.0 gpa in all courses used toward the degree.

2. The student should master, in depth, three knowledge areas in mathematics and/or statistics. The three knowledge areas are chosen by the student, in consultation with an advisor, from among the nine areas: Algebra, Topology, Real Analysis, Complex Analysis, Partial Differential Equations, Numerical Analysis, Regression Analysis/Analysis of Variance, Theory of Statistics, Applied Statistics.

3. The student should be able to communicate mathematical concepts effectively and accurately in writing.

4. The student should be able to orally communicate mathematical concepts effectively and accurately.

VI. Assessment of (Student) Learner Outcomes:

1. Final assessment of whether the student has taken the required coursework is done when the student applies for the degree. Preliminary assessment is done when the student files a Plan of Study, usually in the second semester of study. Grade point averages are monitored for all students, each semester. At the end of each Spring semester a record is maintained of the g.p.a. of every student who has been enrolled in the program (taking at least one class) during the Fiscal year. Each year 4 numbers are reported: the total number of students enrolled in the program; the number of those students with a g.p.a. greater than or equal to 3.0; the number with a g.p.a. greater than or equal to 3.5; and the number with a g.p.a. greater than or equal to 3.9.

2. Student's mastery of knowledge of subject areas at the conclusion of the program will be assessed via the oral Comprehensive Exam. Faculty on the examining committee will evaluate, for assessment purposes, the student's performance in answering questions from each of the three knowledge areas the student has chosen to master.

3. and 4. The student's ability to communicate mathematical concepts will be assessed during the Comprehensive Exam. Each faculty member on the examining committee will assess, using a numerical scale, both the student's written work and oral presentation during the exam.

5. Records will be maintained of outstanding achievement by students in the program, including awards, such as Graduate School awards, or other forms of recognition.

The graduate coordinator is responsible for collecting the data for these assessment activities.

VII. Feedback Loop Used by the Faculty.

The department has a Graduate Assessment Committee composed of the graduate coordinator and three other members appointed by the department chairperson. This committee meets annually to review the results of the assessment. The same committee reviews the department's assessment process periodically. The committee will make recommendations to the graduate faculty based on assessment results.

WICHITA STATE UNIVERSITY

GRADUATE PROGRAM ANNUAL ASSESSMENT DATA REPORT

Department : Mathematics, Statistics, Physics

Program: Mathematics (M.S.)

Contact person: Kenneth Miller, ext 3959, miller@math.wichita.edu

Date of submission: March 16, 2012

Learning Outcomes (most programs will have multiple outcomes)	Assessment Tool (e.g., portfolios, rubrics, exams)	Target/Criteria (desired program level achievement)	Results	Analysis
Students acquire knowledge of mathematical and statistical theory and methods.	Grade point average. For each year 4 numbers are recorded: total # students; Number with gpa>=3.0; gpa>=3.5; gpa>=3.9	90% of students enrolled in program have gpa>=3.0. Other data indicate grade distribution.	FY11: 31,28,24,9	Target met. Not an excessive number of A grades
Students are able to solve graduate level mathematics and statistics problems.	Comprehensive Exam. Three examiners rate students on a scale of 1 to 5 (high) in 4 subjects	Two percentages are given: scores of 3 or above; scores of 5. Target: 3+: 95%	FY11:3+:100%,5: 50%	Target met.
Students are able to communicate mathematical concepts in writing.	Comprehensive Exam. Three examiners rate students on a scale of 1 to 5 (high)	Two percentages are given: scores of 3 or above; scores of 5. Target: 3+: 95%+	FY11:3+:100%,5: 75%	Target met.
Students are able to orally communicate mathematical concepts.	Comprehensive Exam. Three examiners rate students on a scale of 1 to 5 (high)	Two percentages are given: scores of 3 or above; scores of 5. Target: 3+: 95%+	FY11:3+:100%,5:100 %	Target met.

1d. GRADUATE PROGRAM ASSESSMENT PLAN

Department : Mathematics, Statistics, Physics

Program Name: Applied Mathematics (PhD)

Contact person: Kenneth Miller, ext 3959, miller@math.wichita.edu

Date of revision: June 12, 2012

I. Program Mission:

The mission of the Ph.D. program in Applied Mathematics is to provide a high quality doctoral program in applied mathematics that will prepare students as research mathematicians for employment in either academic, industrial or governmental positions.

II. Program Constituents:

The students in the Ph.D. Degree program in Applied Mathematics are the program constituents.

III. Program Objectives:

1. To enable students to reach the forefront of knowledge in some area of applied mathematics and to expand knowledge in this area through original research while also acquiring a broad grasp of the current state of the field.

2. To prepare its graduates for either an academic career in teaching at the college or university level or a non-academic research career as an applied mathematician, statistician or scientist.

IV. Assessment of Program Objectives:

1. This objective is assessed through the learner outcomes given in Section V.

2. We maintain files containing information concerning each graduates employment upon graduation. It is expected that at least 85% of program graduates will obtain employment in either academia, business or industry.

V. (Student) Learner Outcomes:

1. Students shall demonstrate mastery of the core subjects of Real Analysis, Linear Algebra and Numerical Linear Algebra.

2. Students shall demonstrate mastery of their particular area of research specialization.

3. Students shall master some area of specialization and engage in current research.

4. Students shall demonstrate the ability to present their research orally.

5. Each student shall complete a significant research project that contributes to the knowledge base in the field. The results of this research are presented in the Ph.D. dissertation.

VI. Assessment of (Student) Learner Outcomes:

1. Mastery of the core topics is assessed through the written Qualifying Exam given after approximately one year in the program. The student's knowledge of each core subject will be evaluated separately on a scale of 1 to 5 by two members of the examining committee. Summary results of the level of student achievement will be reported annually.

2. Mastery of the area of specialization is assessed during the oral Preliminary Exam. Each member of the student's PhD committee will evaluate the student's mastery of the subject on a scale of 1 to 5.

3. Studying an area of specialization and engaging in research is a program requirement. This learmer outcome is assessed by student progress through the program. Records will be maintained to keep track of the proportion of students reaching each stage in the program. In particular: a) How many of students admitted (and enrolled) later pass the Qualifying Exam; b) How many students who pass the Qualifying Exam later pass the Preliminary Exam; c) How many students who pass the Preliminary Exam later complete the degree.

4. Ability to present research orally is assessed by the student's PhD committee both at the time of the Preliminary Exam and the Final Exam. Each member of the student's PhD committee will evaluate the student on a scale of 1 to 5.

5. a) The dissertation is assessed by the student's PhD committee during the dissertation defense. Each member of the student's PhD committee will evaluate the student's research work on a scale of 1 to 5.

   b) To further assess the quality of research conducted by students in the program the graduate coordinator will maintain information indicating whether each graduate a) has presented a paper at a regional, national or international meeting prior to graduation, and b) has had a paper accepted for publication in a refereed journal within four years of graduation.

6. Records will be maintained of outstanding achievement by students in the program, including awards, such as Graduate School awards, or other forms of recognition.

VII. Feedback Loop Used by the Faculty.

The department had a Graduate Assessment Committee composed of the graduate coordinator and three other members appointed by the department chairperson. This committee meets annually to review the results of the assessment. The same committee reviews the department's assessment process periodically. The committee will make recommendations to the graduate faculty based on assessment results.

WICHITA STATE UNIVERSITY

GRADUATE PROGRAM ANNUAL ASSESSMENT DATA REPORT

Department : Mathematics, Statistics, Physics

Program: Applied Mathematics (PhD)

Contact person: Kenneth Miller, ext 3959, miller@math.wichita.edu

Date of submission: March 16, 2012

Learning Outcomes (most programs will have multiple outcomes)	Assessment Tool (c.g., portfolios, rubrics, exams)	Target/Criteria (desired program level achievement)	Results	Analysis
Mastery of core subjects	Qualifying Exam	80% of those taking exam pass	FY11 8/8 pass	Target exceeded
Mastery of research specialization area	Preliminary Exam	90% of those taking exam pass	FY11 2/2 pass	Target exceeded
Acquire knowledge in a research area and engage in current research	Progress in program	75% of students who pass Qualifying Exam should finish dissertation within 6 years	67% of students who passed Qual from FY01 to FY05 graduated within 6 years	One student left program soon after passing Qual. One did not make satisfactory progress.
Complete significant, publishable research	Dissertation Defense	100% of those defending pass	FY11 2/2 pass	Target met
Complete significant, publishable research	Post graduation publication record	60% of doctoral graduates should publish the results of dissertation within 4 years	7/10 graduates from FY04 to FY11 published within 4 years	Target exceeded

1e. Concurrent Enrollment Assessment Plan (For 2014)

Prepared by:
Stephen W. Brady
Associate Professor of Mathematics and Statistics and
Director, College Algebra Program

Universities recommend that any high school student who wishes to attend any university or college should take four years of mathematics in high school. Three years of mathematics should be minimal preparation. The first college level course in mathematics at any university in the world is Calculus. All other courses before Calculus are remedial whether or not credit is given for those courses. Wichita State University's general education requirements in mathematics for graduation came from the realization that most of our students did not enroll initially with enough prior training in mathematics. Due to our previous open admission policy many were admitted with less than adequate mathematics background to be successful in college. The idea was to raise them to a college entry level of mathematics before they graduated from WSU by requiring knowledge of College Algebra (or higher level mathematics) as part of the general education program. Although this goal has been made much easier to attain due to the rule that the basic skills must be achieved in the first forty-eight hours of coursework, it is much better if the skills are achieved before entering college. Concurrent enrollment classes in mathematics in College Algebra, Trigonometry, and Pre-calculus using the "carrot" of college credit have encouraged students to take more mathematics while still in high school in order to raise their mathematical knowledge level closer to where it should be for college entry.

College Algebra

For the last twenty-two years the comprehensive departmental final for Math 111, College Algebra has been used as part of an overall assessment of the course. The final is worth at least 30% of the course grade for each section of M111. A student successfully satisfies the final assessment by scoring at least 50% on the final together with a C- or better for the semester overall. The weight of 30% for the final brings the course grade down (in most cases) to the D or F level for anyone not achieving a score of at least 50% on the final exam. For courses taught as concurrent enrollment the same weight (30%) for the course grade will be used. If a high school has any mathematics concurrent enrollment class taught by a teacher who does not have a master's degree, all sections in the school use the same department final as that given by the university. In such cases, the assessment criteria are identical. When periodic overall assessments of the university courses are done, the concurrent enrollment classes will be included. Comparisons will be easy to draw concerning student learning outcomes in both environments and how closely concurrent enrollment classes mirror the university classes. In a high school whose mathematical concurrent enrollment classes are taught by teachers with master's degrees, the final does not have to be the same as the university final but the assessment and grading weight are the same. Finals that are different from the one given by the university are approved by the College Algebra Program Director. These classes will be included in any overall assessment of college algebra courses. Comparisons will be made between these classes, university classes, and those concurrent enrollment classes using the university final. The university's SPTE assessment is used to assess each concurrent enrollment class to evaluate student perception of the instructor and course. In addition, any high school assessment of student learning outcomes that is part of a concurrent enrollment course will be requested from the school and compared with our own assessments.

The prerequisites for university College Algebra classes are two years of high school algebra or equivalent and a satisfactory score on the department placement exam or math ACT exam or math SAT exam. Satisfactory scores have been determined to be 15 of 32 on the department placement exam, 20 for math ACT, and 480 for math SAT. The department placement exam, while not a post-assessment tool for College Algebra is an assessment tool for our remedial courses and for a student's previous mathematical preparation. Part of the way we can affect student learning outcomes in College Algebra is to make sure the student is (mathematically) ready to enroll in the course. The department feels that our remedial courses themselves have been excellent preparation. The placement exam is also working well. Most high school mathematics concurrent enrollment courses involve the second semester of a two-semester sequence. In order to qualify for concurrent enrollment in such a course, an A or B is required in the first semester. So, a concurrent enrollment student shows they are ready for college credit by above average achievement in previous semesters.

College Algebra has the following overall course outcomes.

The student will understand the body of mathematical knowledge identified as

College Algebra in order to:

1. Build a foundation for mathematical problem solving.
2. Apply problem-solving techniques to model both mathematical and real-world contexts.
3. Use mathematical language and symbols as a means of

communication
while reading, writing, speaking, and listening.
4. Apply critical thinking and analytical reasoning skills in mathematical
settings.
5. Retrieve and utilize mathematical skills as opportunities arise.
6. Make connections between mathematical problem solving and its
application in other settings.

These outcomes are part of a Course Syllabus that spells out in detail the sections to be covered in College Algebra, the time to be spent on each text section, and the outcomes for each text section. The university final exam is closely tied to these outcomes. Each university class section in College Algebra uses the same book and materials. Each concurrent enrollment section in each school district uses the same text. Although textbooks may be different from ours and differ from district to district, this is not a problem since texts used in the high schools are standard college level texts acceptable for our courses and cover the same material. The university course syllabus for College Algebra (together with the goals and outcomes) are distributed to the high school concurrent enrollment teachers as well as both sample finals and previous university course finals. Concurrent enrollment teachers are encouraged to utilize as much of this material as is possible. One or two meetings (training sessions) have been held each year since 2006 with all the mathematics concurrent enrollment teachers. Course procedures, final exams, assessments, and curricula have been discussed at these meetings with the goal of tying the concurrent enrollment experience as closely as possible with the university course. Meetings with the concurrent enrollment teachers will be conducted each fall for preparation for the spring concurrent enrollment classes. Meetings will be held in the spring to discuss the spring classes and finals. Concurrent enrollment instructors ask to sit in on a summer university courses for the purpose of gaining additional training and experience. We encourage such training experiences.

A standing committee composed of experienced faculty oversees the university course contents, the textbook, the length of time to be spent on topics, etc. The mathematics portion of the basic skills requirement is overseen by a professor in the department of Mathematics and Statistics who carries the title of College Algebra Director. Concurrent enrollment mathematics courses and assessment will be overseen by the same Director. The overall rules governing College Algebra as concurrent enrollment will be the same as those for the university equivalent.

Trigonometry, Math 123 and Math 112, Pre-Calculus

The College Algebra portion of Pre-calculus (a combination of Algebra and Trigonometry), M112, is considered to be equivalent to M111 and is an alternate path that can be used to satisfy the basic skills requirement. It is usually taken by those who have a need or desire to take higher level mathematics but who do not feel ready to take Calculus. Trigonometry at our university has College Algebra as a pre-requisite. Both courses have course syllabi with similar outcomes as those stated above for College Algebra. The classes are taught mostly by regular faculty with some classes taught occasionally by our more senior graduate teaching assistants. Each instructor gives their own final and is responsible for all aspects of the course. Finals for concurrent enrollment classes are submitted and approved by the College Algebra Program Director. Historically, the only assessment done is by the faculty teaching the course and by grade distributions. With respect to concurrent enrollment, all rules and goals governing the College Algebra course discussed above are the same for Trigonometry and Pre-calculus. Concurrent enrollment class assessments will be compared to our Instructor's assessments of their courses.

Assessment Update for Math 111, 112, 123, 2012-2013.

The materials included with this memo are submitted to respond with the requirement from the Kansas Board of Regents that concurrent enrollment classes be reviewed annually by faculty in the discipline. As the Director of the Wichita State University College Algebra Program and a professor in the Department of Mathematics, Statistics, and Physics, I am the faculty member who has been requested to review the mathematics courses M111 (College Algebra), M112 (Pre-calculus), and M123 (Trigonometry).

I have included an updated Assessment Plan that details what and how we assess concurrent enrollment classes. I have also included department collected assessment data on the concurrent enrollment classes. With respect to the past year, university personnel have met periodically with the high school faculty who teach concurrent enrollment classes. We have offered advice and training and have interchanged ideas concerning how to deliver a consistent high quality mathematical product that meets or exceeds our on campus offerings. I review curriculum vitae and approve all faculty assignments with regard to mathematics concurrent enrollment classes. We make sure that our syllabi, course goals, and grading procedures are understood by concurrent enrollment faculty. I review final exams written by any faculty with a master's degree who are not required to give our exams. Course content and texts are monitored. Student teacher evaluations are the same ones given to the university faculty. We try to maintain good relationships with our high school faculty and try to encourage their efforts and provide all necessary support. Since (in any given year) almost all the mathematics concurrent enrollment classes are offered in the Spring, most of our contacts occur during the winter and spring. Overall, I can report that Spring 2013 went very well with no complaints from students or parents or faculty (of which I am aware). I believe high standards are being maintained. The concurrent enrollment faculty are high quality experienced teachers who have solid mathematical backgrounds and are enthusiastic about their participation.

The concurrent enrollment class grades averages are significantly higher than the class grades for courses taught on the university campus. This is due in part from the fact that only high school students with an A or B in the fall semester in one of the year long classes is allowed to enroll for WSU credit in the spring semester. Also, those students who take our equivalent university elementary mathematics courses on campus are students who either did not take these courses in high school or who failed these classes or who have had a long time gap between these courses and their prerequisites. We are comparing some of the best high school students in the concurrent enrollment classes with a much less qualified group in our on campus classes.

Overall, I am pleased with the concurrent enrollment results from Spring 2013.

Stephen W. Brady

Assessment Update for Math 111, 112, 123, 2013-2014.

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Stephen W. Brady

DEPARTMENT OF MATHEMATICS, STATISTICS, AND PHYSICS

2015 SELF-STUDY REPORT

Attachment #2.

Remarks on quality of faculty.

External reviews describing the professional quality of our faculty.

Reviews of research proposals to external agencies.

Professional quality of faculty

In addition to our strong publication record and continuing success in external funding, during the period of this self-study our faculty have given invited lectures at University of Linkoping, Sweden, Vanderbilt University, CUNY Graduate Center, University of British Columbia, Oregon State, and other well-know institutions. Prof. Lancaster gave an invited lecture at the Albert Einstein Institute for Gravitational Physics (MIP-AEI) in May of 2014. Faculty have been co-organizers of several meetings such as workshops at the Banff International Research Station, Canada (twice: Searle and Elcrat, a co-organizer of the Jan 2015 complex analysis workshop. Prof. Elcrat passed away in Dec 2013 and that workshop was dedicated to him with talks given on his work by his coauthors Prof DeLillo of WSU in complex analysis and Prof Protas of Macalaster in fluid mechanics) and the BEACH international conference on high energy physics (Meyer and Solomey in 2012 in Wichita and 2014 in Manchester, UK where Prof. Solomey gave the public lecture on the 50^{th} anniversary of the prediction of quarks.) Prof. Searle is currently (March 2015) hosting a conference here on research in geometry which was funded by the NSF in 2014 and in which half of the speakers are women mathematicians. In addition to their regular duties as referees and reviewers, faculty also serve on the editorial boards of professional journals such as Inverse Problems, and Electronic Transactions on Numerical Analysis.

Distinguished Prof. Isakov has had continual NSF support as an individual investigator since he arrive here in 1988 and joint Cessna, NSF, and NGA support at various times with the WSU inverse problems group, Bukhgeym, DeLillo, and Elcrat with total funding of over $2 million.

External experts have written about Mathematics & Statistics & Physics faculty in different contexts. One remark is in order. Starting 2010 we introduced the blind external evaluation for faculty applying for tenure and/or promotion. Due to confidentiality concerns we cannot exhibit these highly positive evaluation letters here. The same is true for other review letters talking of the research accomplishments of our faculty. So, we decided to include in Attachment #2 some of the previous (in years 2000-2010) letters characterizing the work of our existing faculty. So, a sample of letters from faculty at the University of Washington, University of Illinois, Oxford University, Stanford University, Rutgers University, and one Review for the Kansas NSF EPSCoR Award, and are included in this attachment.

List of External Reviews

1. Professor Gunther Uhlmann — University of Washington
2. Professor John D'Angelo — University of Illinois
3. Professor Nick Trefethen — Oxford University
4. Professor Rafe Mazzeo — Stanford University
5. Review for the Kansas NSF EPSCoR Award
6. John E. Kolassa — Rutgers University
7. Robert Finn — Stanford University
8. NSF Proposals Reviews

UNIVERSITY OF WASHINGTON

SEATTLE, WASHINGTON 98195

(206) 543-1150

Department of Mathematics, Box 354350
C138 Padelford Hall

December 16, 2002

Dr. Robert Kindrick
Vice President, Academic Affairs and Research
109 Morrison Hall
Wichita State University
Wichita, KS 67260

Dear Dr. Kindrick:

This letter is in support of Professor Ziqi Sun's incentive review. I have known professor Sun for many years. He held a postdoctoral position at the University of Washington in 1987-1990. Moreover, we have collaborated in several papers which I consider among my best works.

During the last five years or so Sun has embarked in an ambitious project to understand inverse boundary problems for quasilinear anisotropic elliptic equations. This is a very important field arising in several applications. I thought, however, that this was an impossible project. I am well aware of the major difficulties that one would encounter in such a pursuit. In my own work with Sun we considered a particular case in which the coefficients of the quasilinear equation are independent of the gradient of the solution. This was already quite difficult. The level of difficulty of Sun's project represents a quantum jump over our joint work.

Sun and his student Hervas surprised everyone with his recent paper accepted in Communications in Partial Differential Equations. This is a very deep article which will be the subject of study of researchers in the field of inverse problems for several years to come. I found very striking the connection made between geometry and analysis which was made clear in a beautiful geometric Lemma proved by Sun in another recent article. These works are the product of several years of effort.

Sun is one of the best researchers working in the mathematical theory of inverse problems. He has chosen to work in some the most difficult problems in the area. He has proven significant results that displayed imagination and creativity and masterful command of techniques of partial differential equations and differential geometry. Major advances in Mathematics and other fields are often accomplished after sometime years of silent work. The recent articles of Sun represent such an advance. I very much hope that your University can find the resources to reward Sun for his recent accomplishments.

Sincerely,

Gunther Uhlmann
Professor of Mathematics

cc. Dr. Buma Fridman, Chairman Department of Mathematics and Statistics

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics
273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

August 12, 2003

William D. Bischoff, Dean
Fairmount College of Liberal Arts and Sciences
Wichita State University
Wichita, Kansas 67260-0005

Dean Dean Bischoff:

Thank you for asking me to review the scholarship of Dr. Daowei Ma.

Ma is an excellent and original geometer. Most of his papers deal with geometric issues arising in function theory in several complex variables. Recently he has also published several joint papers of a more applied nature, and I am not knowledgeable to comment on these applied papers.

Perhaps Ma's most impressive paper in recent years is paper (30) from his publication list. Earlier many authors had noted some version of what seemed to be a basic principle in geometry. Small changes can destroy symmetry, but cannot create symmetry. Greene and Krantz, for example, had formulated this idea precisely, and had proved an upper semicontinuity result for automorphism groups of strongly pseudoconvex domains around 1985. A flurry of activity occurred in this area. In 1994, Fridman and Poletsky showed that the principle failed as stated. Their result holds for any bounded domain. Small changes can indeed create symmetries. In (30), however, Ma joined Fridman and Poletsky and the three authors provided a decisive explanation. The principle needed a reformulation, they provided it, and this reformulated principle works. They showed that the dimension of the automorphism group does depend upper semicontinuously on parameters, and it follows that a domain cannot be approximated by a sequence of domains for which the automorphism group has larger dimension. This paper appeared in the American Journal of Math, one of the top journals. The techniques are a beautiful blend of complex analysis and differential geometry. In particular the Caratheodory extremal mappings arise.

Ma has used these extremal mappings in several papers. His 1991 paper (number 10) in the Duke Math Journal, also a top journal, used these mappings as part of a systematic study of estimates for invariant metrics (including the Kobayashi and Caratheodory metrics) on strongly pseudoconvex domains. The results in (10) improve and generalize a well known result of I. Graham. Perhaps (10) is Ma's best early paper.Since then (1997) he (21) had studied these extremal mappings for complex ellipsoids. In (17) he proved a smoothness result for the Kobayashi metric on ellipsoids, and in (16) he studied estimates for the Cauchy-Riemann operator on ellipsoids. (This paper appeared in the strong journal Communications in PDE.) Papers (12) and (13) also involve ellipsoids.I think, of all people who have ever studied complex ellipsoids, Ma's work is the most broad. It reveals his command of analytic methods as well as the geometric methods mentioned above.

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Looking at his publication list it seems that Ma's activity waned a bit in the late 1990's, but it has certainly revived since. In the last four years he has published ten papers, three of them in applied math, and the other seven in geometric complex function theory. He even got involved in joint work with Kim on infinite dimensional complex analysis; they characterized the unit ball in a Hilbert space via automorphism groups.

Ma has made several significant contributions to geometric complex analysis. He has published many good papers in good journals. Although many of Ma's papers are joint, he is certainly an independent scholar; his imaginative geometric insights surely play a big role in these joint papers.

Sincerely yours,

John P. D'Angelo
Professor of Mathematics

-----Original Message-----
From: Nick Trefethen [mailto:LNT@comlab.ox.ac.uk]
Sent: Monday, August 23, 2004 10:48 AM
To: cheryl.miller@wichita.edu
Cc: Int
Subject: Thomas DeLillo

William D. Bischoff, Dean
Fairmount College of Liberal Arts and Sciences
Wichita State University
Wichita, KS 67260-0005

Dear Dean Bischoff,

You have asked me to review the scholarship of Prof. Thomas Delillo, currently Associate Professor in the Dept. of Mathematics and Statistics. I hope this letter will be helpful. Your request comes during my travels on sabbatical, and I hope it will not be a problem that it is sent by email rather than on Oxford letterhead.

I have known Prof. DeLillo since he was a graduate student at New York University in the 1980s, when I was a post-doc there. We had a common interest in the subject of numerical conformal mapping, and this remains the area in which DeLillo has made most of his contributions and is best known. Numerical conformal mapping is a rather small subject, in which it is not hard to list most of the main players of the past few decades: Henrici, Gaier, Opfer, Gutknecht, Wegmann, Fornberg, Marshall, Driscoll, Reichel, Papamichael, Stylianopoulos, Elcrat, Berrut, Trummer, Floryan, Davis, Pfaltzgraff, myself, and DeLillo... that list is a pretty good approximation already. In this area DeLillo is certainly well known and well regarded for his contributions to Schwarz-Christoffel mapping, Wegmann- and Fornberg-type methods, multiply-connected domains, development of inequalities and other estimates, and applications. He is a "player" in this field, and when mathematical scientists in later decades consider what was done with conformal mapping in the half-century after the invention of computers, DeLillo's name will be among those that will be part of the answer.

I was particularly impressed with DeLillo's recent papers on doubly- and multiply-connected Schwarz-Christoffel formulas, joint work with Elcrat and Pfaltzgraff, the second paper not yet in print. This seems a significant advance on a fundamental problem that has been with us since about 1870.

From his base in conformal mapping DeLillo has turned also to other related topics, notably inverse problems and associated problems of convergence of matrix iterations such as conjugate gradients. As far as I can tell he has made worthwhile contributions in these areas. Here as in conformal mapping, the number of his publications is not especially large for somebody at his stage of a career, but the journals involved are for the most part the leading ones. Similarly on other measures of academic activity such as editorial work and involvement in conferences DeLillo does not appear as internationally outstanding, but as solid and active in his field. Certainly I value him as a colleague.

Yours sincerely,

Lloyd N. Trefethen
Professor of Numerical Analysis, Oxford University

--

L. N. Trefethen
Professor of Numerical Analysis and
Fellow of Balliol College, Oxford University

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Department of Mathematics
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mazzeo@math.stanford.edu

September 2, 2004

Dean William Bischoff
Office of the Dean
Fairmount College of Liberal
Arts and Sciences
Wichita State University
Wichita, Kansas 67260-0005

Dear Dean Bischoff,

I am writing in response to your solicitation, earlier this summer, for my evaluation of the scholarship of Prof. Zhiren Jin, an Associate Professor in the Department of Mathematics at Wichita State. I understand that this evaluation is to be used in the current case for promoting him to the position of Professor in this department.

Dr. Jin's research is in the area of partial differential equations; this is a vast area in mathematics with many contacts to other sciences. Jin's particular specialty concerns semilinear and quasilinear elliptic equations, which again has many important applications, both in mathematics and elsewhere. In his career he has been quite productive and has written a significant number of important and difficult papers. He has without doubt established himself as a real authority in this field.

You ask me to comment on various aspects of his work, specifically its originality, significance, level of activity and appropriateness of journals in which he has published.

Jin's earliest work is quite closely tied to geometry, as is natural given the predilections of his advisor. He began to make significant contributions very early, amongst which I should point out his paper [3], which stimulated a fair amount of work by other researchers. He moved on and began to work on problems concerning solutions of more general semilinear, and later, quasilinear, elliptic equations. This class of equations is really fundamental in the field and so any new progress here is likely to have real significance. Some of this work has been done in a long and fruitful collaboration with Kirk Lancaster, but much has been done on his own too. Looking carefully at these papers, I feel that Jin exhibits technical mastery in a very difficult subject, and it is nice to see how the scope of his interests continues to widen. He has definitely displayed independence and originality in his work.

To be even more specific, much of Jin's work in the mid to late '90's concerns pushing the limits on the applicability of various comparison theorems for broad classes of quasilinear elliptic equations on noncompact domains. While formulated purely analytically, these results apply to a lot of very important and well studied problems in geometry, including the prescribed mean curvature equation, the capillarity equation, etc. Closely related to these ideas are estimates for solutions of such equations at infinity. He has kept on pushing on these difficult problems and I think his papers with Lancaster, [17], [19], [21], [26], are particularly incisive. More recently he has been working somewhat different questions related to solvability; I think [23] is particularly interesting.

He has published in a range of very reputable journals; I should point out that his papers [19], [20] appeared in a journal for which I am the managing editor and I encouraged their submission to this journal and was happy to have them appear there. His rate of production has been on the average quite good, and it is clear to me that he will continue with his record of contributing very sound scholarship.

Altogether, my opinion is that the work of Zhiren Jin is very solid, and his record definitely exhibits all the qualities you are looking for. I also look very favourably on his extended collaboration with Lancaster; the fact that these two are in the same department and able to interact so well together is a real plus.

Sincerely,

Rafe Mazzeo

Rafe Mazzeo
Professor of Mathematics

CONFIDENTIAL

Kansas NSF EPSCoR

First Award Review – Due January 10, 2005

Name of Principal Investigator: Thalia D. Jeffres
Title of Proposal: Special Metrics and PDE's on Singular Manifolds

Instructions: Before writing your review, please read: 1) NSF Merit Review Criteria, and 2) the Kansas NSF EPSCoR *Request for Proposals*.

Following each criterion below are potential considerations that you may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Please address only those considerations that are relevant to the proposal and for which you feel qualified to make judgments. In responding to Criterion 2, please place special emphasis on the likelihood that the proposed S&T infrastructure improvements "will result in lasting improvements to the state's STEM research and educational infrastructure and thereby, increased national R&D competitiveness" (NSF 04-564).

After providing a qualitative judgment of the proposal's merits against the criteria, please make quantitative judgments in Section 3.

Then, in Section 4, please provide suggestions that will help improve this proposal. For example, are there specific suggestions that will help this investigator become competitive for federal funds? Is the trajectory of the research appropriate and well thought-out relative to the discipline? Is the education and human resources component well thought-out? Are there well-developed procedures to implement the project plan? These are suggestions and not all will apply to any given proposal.

Criterion 2: What are the broader impacts of the proposed activity?

- How well does the activity advance discovery and understanding while promoting teaching, training, and learning?
- How well does the proposed activity broaden the participation of underrepresented groups?
- To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?
- Will the results be disseminated broadly to enhance scientific and technological understanding?
- Does this proposal contain research in an area that is a priority to Kansas? (Priority will be given to proposals for research in biology, chemistry, physics, geology, mathematics, computer science and engineering. However, proposals in the area of **Living Systems** will receive priority for First Award funding. **Living Systems** includes research related to environmental quality, the basic biological sciences, biochemistry, bioengineering, biophysics, biotechnology, and bioinformatics.)
- How likely is it that a First Award will significantly improve the PI's ability to become competitive and develop a self-sustaining research program?
  How likely is it that the proposed research will have an impact on economic development in Kansas in the next five to ten years?

The broader impacts of the proposed activity are well documented. Jeffres worked in Mexico before moving to Kansas, and has mentored several students there. As she points out, this experience should make her more effective training students from different cultures. The proposal indicates a commitment to training students, including under-represented groups, at the High School level.

She brings to a heavily application-oriented department a more modern component. In the twentieth century, powerful ideas such as coordinate-invariance, local exploitation of symmetry, and global
topology of abstract spaces led to foundational breakthroughs in our understanding in the twentieth century. These advances have fundamentally impacted even the most application-oriented mathematics.

CONFIDENTIAL

Kansas NSF EPSCoR

First Award Review – Due January 10, 2005

Name of Principal Investigator: Thalia Jeffres

Title of Proposal: Special Metrics and Differential Equations on Singular Spaces

Instructions: Before writing your review, please read: 1) NSF Merit Review Criteria, and 2) the Kansas NSF EPSCoR *Request for Proposals*.

Following each criterion below are potential considerations that you may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Please address only those considerations that are relevant to the proposal and for which you feel qualified to make judgments. In responding to Criterion 2, please place special emphasis on the likelihood that the proposed S&T infrastructure improvements "will result in lasting improvements to the state's STEM research and educational infrastructure and thereby, increased national R&D competitiveness" (NSF 04-564).

After providing a qualitative judgment of the proposal's merits against the criteria, please make quantitative judgments in Section 3.

Then, in Section 4, please provide suggestions that will help improve this proposal. For example, are there specific suggestions that will help this investigator become competitive for federal funds? Is the trajectory of the research appropriate and well thought-out relative to the discipline? Is the education and human resources component well thought-out? Are there well-developed procedures to implement the project plan? These are suggestions and not all will apply to any given proposal.

Criterion 2: What are the broader impacts of the proposed activity?

- How well does the activity advance discovery and understanding while promoting teaching, training, and learning?
- How well does the proposed activity broaden the participation of underrepresented groups?
- To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships?
- Will the results be disseminated broadly to enhance scientific and technological understanding?
- Does this proposal contain research in an area that is a priority to Kansas? (Priority will be given to proposals for research in biology, chemistry, physics, geology, mathematics, computer science and engineering. However, proposals in the area of **Living Systems** will receive priority for First Award funding. **Living Systems** includes research related to environmental quality, the basic biological sciences, biochemistry, bioengineering, biophysics, biotechnology, and bioinformatics.)
- How likely is it that a First Award will significantly improve the PI's ability to become competitive and develop a self-sustaining research program?
- How likely is it that the proposed research will have an impact on economic development in Kansas in the next five to ten years?

I have seen the proposer lecture in professional seminars (e.g. Rutgers University). Her style is clear and informative. I have no doubt that she will attract and motivate young people interested in mathematics. Clearly, the proposer's experience as a faculty member in Mexico will be a unique advantage. Her knowledge of Spanish will be useful in attracting Latin-American students in the area.

She has already begun projects with two collaborators at least (Loya and Mazzeo). This should attract mathematicians to the growing department at Wichita.

The work proposed here is of a world class nature. It should be published in significant research journals. Jeffres's record already shows this.

A first award will give the project a significant boost. Travel funds are probably the most significant item here. The proposer (like all serious researchers) needs to meet with collaborators and attend conferences. It is very difficult to do this kind of work in isolation.

THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS

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1 Aug 2008

Dean William D. Bischoff
Fairmount College of Liberal Arts
Wichita State University
Wichita, Kansas 67260-0005

Dear Dean Bischoff,

This letter is in response to your request for an evaluation of Chunsheng Ma's research record, to be used to determine whether he will be promoted to professor.

Dr. Ma's record of publication reveals that he is a very productive researcher, both in terms of volume and quality of work. His work has appeared in a variety of statistical and other journals; thise range from top-tier journals to middle-tier journals. This record compares favorably with other scholars receiving promotion to the rank of professor at major research universities.

The large number of successful research projects listing Dr. Ma as the sole author indicate that he is clearly established as an independent scholar. His published articles represent a contribution to the field of statistics typical for a senior academic. He is certainly appropriately active in our field. Since most of his sole--author research relates to time series, and I don't know the time series literature, I must trust the judgement of the journal referees when attesting to its originality.

I will illustrate the importance of Dr. Ma's work by commenting on two of his manuscripts involving multivariate survival functions (Metrika, 1998, and Journal of Multivariate Analysis, 2000). I choose these not because they are Dr. Ma's best papers, but because they are the ones that I feel most excited about reading. Survival analysis involves the study of times until an event occurs; these models are routinely used to describe the superiority of one treatment over another treatment at delaying patient death. Trying to account for multiple types of events simultaneously (for example, time until consecuitive recurrences of a disease, or time until two family members die) is much more difficult than accounting for times until events separately, since generally we assume that these event times are dependent, and typically univariate survival models do not have natural correlated extensions, as do, say, univariate normal models. The Metrika paper investigates the logical conclusions of some assumptions about multivariate survival models, and the Journal of Multivariate Analysis paper introduces a new class of survival models. This work is very important, and is likely to have a large impact.

Dr. Ma has an admirable research record for a university faculty member being considered for promotion to professor; this record displays all of the requirements listed in your letter of 20 June. I note that your letter explicitly requests that I do not make a recommendation for or against promition. The lack of such a statement in my letter should not be interpreted as a reticence on my part.

Sincerely,

John E. Kolassa
Professor and Graduate Program Director
Statistics and Biostatistics
Rutgers University

STANFORD UNIVERSITY
STANFORD, CALIFORNIA 94305-2125

DEPARTMENT OF MATHEMATICS
Robert Finn (650) 723-2605, FAX 725-4066
finn@math.stanford.edu

August 9, 2010

Buma Fridman, Chairperson
Department of Mathematics and Statistics
Wichita State University
1845 Fairmount St.
Wichita, Kansas 67260-0033

Dear Professor Fridman,

Kirk Lancaster transmitted to me your request for evaluation of his scientific contributions.

I've had contacts with Kirk over many years, and I've refereed some of his papers. There has been no occasion in which I was not impressed by the quality and originality of the new contribution. I did once or twice have to request rewriting for clearer exposition.

I've come now to view Kirk as an outstanding mathematician of world stature. He has proved deep and beautiful theorems, some of which will certainly become building blocks for major developments of the future, and I expect his scientific influence will be felt long after all of us are gone. His methods have been original and ingenious, requiring active working conversance with subtle points of modern theory, and displaying strikingly deep insight and comprehension. He has suffered for being a "non-smooth" expositor whose papers tend to focus on technical detail and can be difficult to read. When I look at some of his papers, the pervading thought that comes to mind is that he tacitly assumed the reader to share his detailed familiarity with fine points of modern theory.

Kirk has produced a considerable range of original work; I'll focus here on things that have major meaning for me. The paper that first put his unusual talents into perspective for me was his spectacular joint work with David Siegel in the Pacific Journal **176** (1996) 165—194; **179** (1997) 397-402. Using very original methods in conjunction with boundary regularity estimates due to E. Heinz, those authors established quite remarkable and certainly unexpected restrictions in kinds of behavior of a capillary surface at a re-entrant corner. Specifically they demonstrated the presence of "fan domains" attaching to the corner, in which the radial limits of the surface height are constant in angle of approach. They showed also that in some cases a "central fan" of angular width π can appear. As coroliary of the method, they obtained a very elegant proof of continuity of solutions of "$\mathcal{R}$-type" at a protruding corner. This result had first been shown by Leon Simon, based on delicate reasoning from geometrical analysis, in the special case of constant data and under some restrictions; the restrictions were later removed by Luen-Fai Tam, using similar methods. The L&S proof gives a best possible result for general data, in a clear conceptual context and under no restrictions.

The problem was taken up later by Danzhu Shi in an impressive work that appeared in a special volume on capillarity of the Pacific Journal (vol. 224, 2006). Shi gave the first formal characterization of conditions determining the individual kinds of behavior at a re-entrant corner. Her results had a sense of being "right", however they were based on validity of a conjecture Paul Concus and I had made about 1970, on discontinuity of certain solutions in protruding corners. Sophisticated computer calculations had supported the conjecture (just barely!), however attempts by a number of people (myself included) to prove it had led to naught.

Several months ago I accepted Kirk's proof of the conjecture for publication in the Pacific Journal, and it should appear shortly. I was very uneasy about this paper, as it is long and hard, and embraces a number of individually delicate steps, each requiring difficult and delicate techniques. I found a tough referee who took a long time and produced challenging questions on sensitive points, but Kirk was able to hold his ground. This paper effectively closes a remarkable chapter of a basically new theory with striking and deep results that have no parallel in classical theory in my experience. I think there may also be important applications of Kirk's discoveries, on matters such as insulating coatings on computer chips with rectangular sections.

I have no idea as to the context in which Kirk's request to me arose. The papers I have indicated are on topics of direct interest for me, and my experience with the problems has I think given me some perspective as to their difficulty and their continuing importance. I am convinced that Kirk's contributions have a permanence in the scientific scheme of things that very few professional mathematicians can match.

Sincerely,

R Finn

Robert Finn

Proposal Status | MAIN

Organization: Wichita State University

Review #1

Proposal Number:	1411375
NSF Program:	Applied Mathematics
Principal Investigator:	Isakov, Victor M
Proposal Title:	Some Inverse Problems: increasing stability, drift-diffusion and elasticity systems
Rating:	Excellent

REVIEW:

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to intellectual merit.

1. What is the potential for the proposed activity to advance knowledge
and understanding within its own field or across different fields?

The PI proposes a broad investigation with focii on
(P1) Increasing stability in inverse problems for PDEs,
(P2) Drift-diffusion equations and systems, and
(P3) Inverse problems for some anisotropic systems in elasticity.
Given the PI's track record and the proposal's degree of specificity
the potential for advancement of the mathematical approach to Inverse
Problems is high.

2. To what extent do the proposed activities suggest and explore creative,
original, or potentially transformative concepts?

3. Is the plan for carrying out the proposed activities well-reasoned,
well-organized, and based on a sound rationale? Does the plan incorporate
a mechanism to assess success?

The proposal is well motivated, reasoned, organized and articulated.
Class (P1) examines continuous dependence in Cauchy and scattering problems
by supporting arguments in favor of new inequalities and careful estimation
of the associated constants for special domains.
Class (P2) continues the PI's study of numerical and analytical issues
arising from Black-Scholes-like equations and extends his work on
semiconductor models to recent inverse problems for ion channels.
Class (P3) presents several line of attack on the identification of
the 5 coefficients of a transversely isotropic body from boundary data.

4. How well qualified is the individual to conduct the proposed activities?

The proposed activities are natural continuations of the PI's long running research program. That said, much of the space devoted to summary of prior results could have been devoted to even finer plans for the proposed projects.

In the context of the five review elements, please evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

The proposed work will strengthen the PI's already broad impact on the applications of analysis to inverse problems for PDEs. Notably, for example, by weakening geometric hypotheses in the Cauchy problem and by advancing our understanding of models for ion channels.
The PI is also building an applied math group at his institution, with attention to students and engineers and scientists.
This proposal will support 1 graduate student.

Please evaluate the strengths and weaknesses of the proposal with respect to any additional solicitation-specific review criteria, if applicable

Summary Statement

This is an ambitious proposal to advance our mathematical understanding of Inverse Problems on several independent fronts. The PI has made significant contributions to these, or closely allied, areas and the proposal offers several promising avenues for refinement and improvement of the state of the art.

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N: Award Id : 1207597, PI: Jeffres 87

rom: "Kania-Bartoszynska, Joanna" <jkaniaba@nsf.gov>
o: "Thalia Jeffres" <jeffres@math.wichita.edu>
ate: 05/17/12 09:55 AM

ar Thalia,
e award letter came this morning! Your award is now official, here is a copy of the email.
ngratulations and all the best,
nna

--Original Message-----
om: Martin, Denise M.
nt: Thursday, May 17, 2012 8:23 AM
proposals@wichita.edu
: BFA DGA Awards; Alston, Sharon J.; Kania-Bartoszynska, Joanna
bject: Award Id : 1207597, PI: Jeffres

ard Date:	May 17, 2012
ard No.	DMS-1207597
oposal No.	DMS-1207597

. J. David McDonald
sociate Vice President for Research
chita State University
45 Fairmount
chita, KS 67260-0007

ear Dr. McDonald:

e National Science Foundation hereby awards a grant of $178,010 to Wichita State University for support of the project scribed in the proposal referenced above .

is project, entitled "Differential Equations on Singular Spaces and Asymptotic Methods," is under the direction

alia D. Jeffres.

is award is effective July 1 , 2012 and expires June 30, 2015.

is grant is awarded pursuant to the authority of the National Science Foundation Act of 1950, as amended (42 U.S.C. 361-75) and is subject to Research Terms and Conditions (RTC), dated June 2011, and NSF RTC Agency Specific quirements, dated February 1, 2012, available at http://www.nsf.gov/awards/managing/rtc.jsp.

is award is subject to the Federal Funding Accountability and Transparency Act (FFATA) award term entitled, Reporting ubawards and Executive Compensation, which has been incorporated into the NSF Terms and Conditions referenced ove.

the awardee has any questions related to the pre-populated data associated with this award in the FFATA Subaward eporting System, such questions should be submitted to: FFATAReporting@nsf.gov or by phone to: (800) 73-6188.

accordance with sections 1869a and 1869b of title 42 of the United States Code, the awardee will do the llowing:

Obtain from the school board or comparable authority responsible for the schools considering participation in the oject, written approval prior to involvement of pre-college students in pre-college education research and development, lot-testing, evaluation, and revision of experimental and innovative pre-college curriculum.

Include in every publication, testing, or distribution agreement involving instructional materials developed under this ant (including, but not limited to, teachers' manuals, textbooks, films, tapes, or other supplementary material) a quirement that such material be made available within the school district using it for inspection by parents or guardians children engaged in educational programs or projects using such material of that school district.

e attached budget indicates the amounts, by categories, on which NSF has based its support.

Please understand that reviewers address their comments chiefly to NSF, not to Principal Investigators. Reviews containing irrelevant, non-substantive, or erroneous statements are not used in evaluating the merits of proposals. The panel was instructed to assess proposals based on the two main NSF review criteria, namely, "Intellectual Merit" and "Broader Impacts." The panel produced a ranking that placed each proposal into one of three categories: (i) highly recommended for funding (roughly the top 10% of the proposals under consideration), (ii) recommended for funding (the next 30%), or (iii) not recommended for funding (the remaining 60%).

My recommendation is based on the following analysis of the reviews and panel summary:

Three mathematicians reviewed this proposal and returned comments headed by ratings of G, G, and G. The Geometric PDE panel placed the proposal in the Not Recommended for Funding category.

Intellectual Merit: Reviewers liked the proposal, the topics, and acknowledged that the PI has already made significant contributions to some of the problems. However, during the meeting, panelists were not in agreement about the ranking of the proposal in comparison to other submissions. While a particular panelist, who did not write a review, thought that computations of some specific examples made the proposal very concrete and hence increasing its chances to lead to interesting applications, others thought that they narrowed the scope of the proposal.

Broader Impacts: The panel considered this part of the proposal to be extremely strong. The PI is involved middle school outreach, working especially with disadvantaged students.

Summary: Quoting from one of the reviewers "A strong research proposal with exceptional broader impact." During the panel meeting, this proposal stayed among the ones recommended for funding until the end of the panel. Because panelists were asked to place at least 60% of the proposals in the Not Recommended for Funding category, the panel reluctantly moved this proposal to the non recommended group. This reflects the intense competition for grants at DSM, and in particular in Geometric Analysis. Regretfully, I have to recommend that this proposal be declined and strongly recommend that the PI reapply in the near future.

I hope that the reviews and the panel summary, together with the comments above will assist you in the preparation of future proposals. I also hope that your research efforts will be productive.

Please feel free to contact me should you have any questions.

Sincerely,

Maria Helena Noronha, Program Director
Geometric Analysis and Topology
Division of Mathematical Sciences
Tel (703) 292-4868
Fax (703) 292-9032
Email: mnoronha@nsf.gov

Reviews

All of the reviews of your proposal that have been released to you by your NSF program officer can be viewed below. Please note that the Sponsored Project Office (or equivalent) at your organization is NOT given the capability to view your reviews.

Document:	**Release Date:**
Panel Summary #1	Apr 25 2011 11:10AM
Review #1	Apr 25 2011 11:07AM
Review #2	Apr 25 2011 11:07AM
Review #3	Apr 25 2011 11:07AM

Proposal Status | MAIN

Organization: Wichita State University

Review #1

Proposal Number:	1406007
NSF Program:	TOPOLOGY
Principal Investigator:	Walsh, Mark
Proposal Title:	The Space of Positive Scaler Curvature Metrics
Rating:	Very Good

REVIEW:

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to intellectual merit.

The PI's research is roughly in the area of positive scalar curvature and topology; he wishes to construct new PSC metrics on some manifolds, explore obstructions to PSC metrics on others, explore a number of questions related to cobordism, and explore the topology of spaces of PSC metrics. He lays out 3 general aims, 5 specific questions, and 3 "family projects" (which are basically more general or less well-defined questions). The research area itself is an important and historically very fruitful one, and there is a lot of current research interest. The PI has had a number of significant result in this area, and he is likely to have more.

There is good potential to advance knowledge. There is also some potential for a real breakthrough, but this is difficult to evaluate (this reviewer is skeptical of the PI's claims that he can, in a few years time, come to fully understand certain moduli spaces).

Many of the PI's claims and avenues of investigation use some original techniques. Much of this work is "filling in the details" of an expected kind, but some of it would produce real advances.

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

The broader impact of the PI's work appears to be in the form of expanding educational opportunities at Wichita State University, in the form of support for graduate students and the hiring of a postdoc. The PI has specific plans for activities for these hires. He has a sub-goal of expanding the representation of differential geometry at his university. The Pi also mentions some synergistic activities, which would be at best indirectly supported by NSF funding. The PI also mentions several areas of mathematics that would benefit from his research, giving his work some cross-disciplinary appeal.

Please evaluate the strengths and
weaknesses of the proposal with respect to any additional solicitation-specific review criteria, if
applicable

Summary Statement

The PI has a sound intellectual basis for his research; altogether, this reviewer rates it "very good" in comparison to other proposals. His broader impact merits, which are limited to bringing graduate students and a postdoc onto his research team, as well as implied indirect merits, are rated "good".

A final note about the budget. The PI is requesting $800,163, which is high.

Back to Proposal Status Detail

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Proposal Status | MAIN

Organization: Wichita State University

Review #2

Proposal Number:	1406007
NSF Program:	TOPOLOGY
Principal Investigator:	Walsh, Mark
Proposal Title:	The Space of Positive Scaler Curvature Metrics
Rating:	Good

REVIEW:

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to intellectual merit.

This proposal is concerned with the structure of the moduli space of Riemannian metrics with positive sectional curvature (when it is nonempty!) on a prescribed manifold. Using impressive techniques from parametrized Morse theory, the author has given a nice proof of the (known) theorem that the homotopy type of the space of such metrics is a cobordism invariant of the underlying manifold, and in recent work [arXiv:1301.5670] he has argued that the space of such metrics, on the standard n-sphere, is an n-fold loopspace. He seems to have found some fruitful lines of inquiry on an interesting subject that has perhaps been stuck for a while.

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

This seems to be the first progress in an interesting classical subject
in a while.

Please evaluate the strengths and
weaknesses of the proposal with respect to any additional solicitation-specific review criteria, if
applicable

Summary Statement

Back to Proposal Status Detail

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Proposal Status | MAIN

Organization: Wichita State University

Review #3

Proposal Number:	1406007
NSF Program:	TOPOLOGY
Principal Investigator:	Walsh, Mark
Proposal Title:	The Space of Positive Scaler Curvature Metrics
Rating:	Very Good

REVIEW:

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to intellectual merit.

This is a proposal to study spaces of positive scalar curvature metrics on a compact manifold. The PI has put forward a number of concrete questions and problems built on recent results in the area. A key point is to use deep results on pseudo-isotopy and families of Morse functions to understand the corresponding structures in the context of positive scalar curvature metrics. The proposal is well reasoned and the PI is likely to make good progress. Indeed, over the past few years the PI has established a number of very good results in this area, and his proposal is to continue that work. Some of these results are considered to be major breakthroughs by people working in the field. This is a case where I believe the NSF should stand up and recognize the achievements of someone who has not been previously supported.

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

The nature of the subject ties together deep areas of topology and interesting areas of differential geomety. Progress here should have synergistic effects.

Please evaluate the strengths and
weaknesses of the proposal with respect to any additional solicitation-specific review criteria, if
applicable

Summary Statement

This is a well-conceived proposal aimed at understanding the structure of families of positive scalar curvature metrics on a compact manifold. I both reflects and is built upon deep results in topology.
It represents an extension of some outstanding recent results of the PI, and is very highly deserving of support.

Back to Proposal Status Detail

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Proposal Status | MAIN

Organization: Wichita State University

Review #4

Proposal Number:	1406007
NSF Program:	TOPOLOGY
Principal Investigator:	Walsh, Mark
Proposal Title:	The Space of Positive Scaler Curvature Metrics
Rating:	Good

REVIEW:

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to intellectual merit.

The PI proposes to study several questions at the interface of topology and geometry. In particular, these questions involve positive scalar curvature (psc) metrics on manifolds. Proposed projects involve the moduli spaces of such metrics, issues concerning concordance and isotopy classes of such metrics, and techniques for constructing interesting families of psc metrics. The PI is a young researcher (2009 Ph.D.) who has already established a solid publication record and has acquired several higher profile collaborators. The proposal itself is very well written and accessible, and it is a good indicator that such a young PI has such a well-defined research plan laid out for himself. The only downside to this proposal is its specificity. It is not unusual for a young researcher to have a narrow focus, but other young researchers in this group (for example [Material redacted per PAM Chapter XI G.2]) nonetheless seem to have more ambitious proposed projects. No doubt this PI's proposals will become even stronger as his interests naturally broaden with time.

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

The PI is attempting to establish a research group in his field at his home institution, including graduate students and postdocs, though this group has not been firmly established yet. The PI has given expository talks on topology to audiences consisting of elementary, middle and high school students and their parents. He has written and distributed lecture notes, and he is working with a computer scientist on a geometric problem arising from her work. Overall, the PI's broader impact is quite reasonable for a young PI.

Please evaluate the strengths and
weaknesses of the proposal with respect to any additional solicitation-specific review criteria, if
applicable

Summary Statement

While I consider this a good proposal in and of itself, unfortunately it suffers in comparison with many of the other proposals I have reviewed, largely due to its specificity of scope compared to the other proposals. The PI has established several solid research goals within his area of specialization and appears to be a very promising mathematician, but too many other proposals contain multiple streams of research across a variety of disciplines. Thus I reluctantly have to give this proposal a relatively lower rank compared to the other proposals reviewed.

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Proposal Status | MAIN

Organization: Wichita State University

Review #5

Proposal Number:	1406007
NSF Program:	TOPOLOGY
Principal Investigator:	Walsh, Mark
Proposal Title:	The Space of Positive Scaler Curvature Metrics
Rating:	Very Good

REVIEW:

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to intellectual merit.

Intellectual Merit: áseems quite high as this proposal lies at the intersection of geometry, topology and analysis and has potential impact in a variety of settings. Furthermore the breadth makes this a very worthwhile project.

In the context of the five review elements, please
evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

Broader Impacts: áthese are Ok but not spectacular, obviously mentoring students in geometry and topology and hosting high level speakers are worthy goals, and as a faculty member at Wichita State the PI will have some local impact.

Please evaluate the strengths and
weaknesses of the proposal with respect to any additional solicitation-specific review criteria, if
applicable

Summary Statement

Walsh proposes to continue his work on developing methods for constructing topologically significant families of psc-metrics. These constructions will aid in addressing questions concerning positive scalar curvature. In particular, this project aims to establish a correspondence between a space of geometric objects (psc-metrics) and a space of smooth topological ones (generalized Morse functions). More specifically, the PI outlines a program to

--further develop techniques for constructing interesting families of psc-metrics on a smooth compact manifold X
--address key questions about the metrics constructed by these tools, with regard in particular to psc-concordance and psc-isotopy
--apply these techniques to further understanding on the topology of the space of psc-metrics, Riem+(X), and its various moduli spaces

Review: áquestions about the existence or non-existence of various curvature types, positive Ricci curvature or non-negative sectional curvature for example, are of considerable interest. The classification of manifolds which admit metrics of positive scalar curvature (psc-metrics) has made lots of progress. A related problem is that of understanding the topology of the space of all psc-metrics on a smooth manifold. This problem underlies Walsh's proposal, which is extremely well written. He has a strong publication record (including a paper in Geometry and Topology and an AMS Memoir) and thus is a young researcher who shows great promise. He deserves to be supported
(note however that the budget is unrealistic and should be drastically cut).

Grade: VG+

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Proposal Status | MAIN

Organization: Wichita State University

Panel Summary #1

Proposal Number: 1406007

Panel Summary:
Panel Summary

Intellectual merit: this is a nice proposal in geometric topology. The PI is an expert in parameterized Morse theory and proposes to use that expertise to study questions about the space of positive curvature metrics. The panel liked the PI's new proof of the cobordism-invariance of homotopy types of these spaces. The proposal was considered to be one of the best-written, and the pictures were great. Some of the proposed research seems to present some good new ideas in a classical field.

Postdoc mentoring plan: the panel felt like the postdoc mentoring plan did not include any planned mentoring.

Broader impact: the PI would like to develop a research group at Wichita State. The panel did not find this to be a realistic goal at this point. In general, we found the previous broader impacts to be acceptable for the career-level of the PI.

The panel thought that the amount requested for travel support was completely unreasonable.

The PI has not had previous support from the NSF.

This was a solid proposal, but not one of the best. Due to the presence of many excellent applications, the panel placed the proposal in the not recommended for funding category.

The summary was read by/to the panel and the panel concurred that the summary accurately reflects the panel discussion.

Panel Recommendation: Not Recommended

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Proposal Status | MAIN

Organization: Wichita State University

Panel Summary #2

Proposal Number: 1406007

Panel Summary:
Panel Summary

Intellectual Merit: This project is concerned with understanding positive scalar curvature metrics. The PI has already obtained interesting results in this direction. In particular, one member of the panel was very impressed by the PI's recent work on the homotopy type of the space of positive scalar curvature metrics on the sphere. Another member of the panel described this as a solid middle-of-the-road proposal, which seemed not as strong as the competition.

Broad Impact: The PI plans to build up a geometry group at his institution, and he has specific plans to supervise graduate students.

Results from prior NSF support: N/A

The panel places the proposal in the "Recommended for funding if possible" category.

The summary was read by/to the panel and the panel concurred that the summary accurately reflects the panel discussion.

Panel Recommendation: Fund If Possible

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Catherine Searle <searle.catherine@gmail.com>

FW: your conference proposal 1518937

1 message

Searle, Catherine <Catherine.Searle@wichita.edu> Fri, Mar 13, 2015 at 1:53 PM
To: "searle.catherine@gmail.com" <searle.catherine@gmail.com>

From: Kania-Bartoszynska, Joanna [jkaniaba@nsf.gov]
Sent: Wednesday, February 04, 2015 3:52 PM
To: Searle, Catherine; 'cplaut@math.utk.edu'; Walsh, Mark; leonard.wilkins@uncp.edu
Cc: Castano-Bernard, Ricardo; Stark, Christopher; Wang, Shuguang; Kania-Bartoszynska, Joanna
Subject: your conference proposal 1518937

Dear Catherine at al,
Thank you very much for providing an updated version of the project description for your conference proposal DMS 1518937 " Smoky Great Plains Geometry Conference".
We discussed it at length and decided to recommend an award for one year of funding, with the budget as requested for the first year.

We felt that the potential broader impacts of this activity would be strong. We had some issues with the writing of the proposal - we found the paragraph comparing the speaking engagements of Brendle and Mirzakhani to be questionable, since lots of factors go into who the speakers are, including having the invited person agree to speak. We also debated the method of having a specific quota of speakers of any gender. Nevertheless, the goal of showcasing female geometers is laudable.

The conference series still seems to be a pilot activity, and we would like to see the results of prior conferences before committing to several years of support. We recommend that the potential future proposals devote more place to the scientific description of the proposed meetings.

In order to proceed with the recommendation I need a revised budget from you for one year of support and an abstract. The budget should be provided by your Sponsored Research Office, and an abstract should be included as plain text inside an email message from you.

Regarding an abstract, the following is a quote from NSF documents:

Abstracts are a public record of active and expired awards and are an important source of information on NSF activities. The purpose of the Abstract is to describe the project and justify the expenditure of Federal funds. Abstracts must not contain inappropriate or confidential information, and because they are available to such a wide audience, high standards of quality must be maintained in preparing them.

The NSF award abstract has two parts, which should appear in the following order:

-Part 1: A nontechnical description of the project, which explains the project's significance and importance. This description also serves as a public justification for NSF funding by articulating how the project serves the national interest, as stated by NSF's mission: to promote the progress of science; to advance the national health, prosperity and welfare; or to secure the national defense. This part of the abstract should describe the fundamental issues the project seeks to address, as well as other potential benefits, such as how the project advances the field, supports education and diversity, or benefits society. This part should be understandable by a broad audience.

-Part 2: A technical description of the project that states its goals and scope, the methods and approaches to be used, and its potential contribution. In many cases, the technical project description may be a modified version of the project summary that is submitted with the proposal. However, the technical description should reflect any changes in the project's goals made after the review process.

Upon award of a proposal, the Abstract is available in the Award Search application and via FastLane.

We ask that you include the name, place and dates of the conference as the first sentence of the abstract and that you include a webpage listing at the end.

I should add that this is not an official announcement of an award. We can only recommend that an award be made. The official award itself is made by the Division of Grants and Agreements.

As soon as I receive an abstract and a revised budget from you I will initiate the paperwork that will result in an official award announcement.
It will take an additional four to six weeks for the processing to be completed.

With best regards,
Joanna

Dr. Joanna Kania-Bartoszynska
Program Director
Geometric Analysis and Topology
Division of Mathematical Sciences
National Science Foundation

Gmail by Google

Catherine Searle <searle.catherine@gmail.com>

your conference proposal DMS - 1408592

18 messages

Kania-Bartoszynska, Joanna <jkaniaba@nsf.gov> Mon, Jan 27, 2014 at 4:55 PM
To: "searleca@onid.orst.edu" <searleca@onid.orst.edu>, "cplaut@math.utk.edu" <cplaut@math.utk.edu>, "leonard.wilkins@uconn.edu" <leonard.wilkins@uconn.edu>
Cc: "Kania-Bartoszynska, Joanna" <jkaniaba@nsf.gov>, "Wang, Shuguang" <SWANG@nsf.gov>, "Castano-Bernard, Ricardo" <RCASTANO@nsf.gov>, "Stark, Christopher" <cstark@nsf.gov>

Dear Professors Searle, Plaut and Wilkins
We have discussed your conference proposal DMS - 1408592 "Smoky Cascade Geometry Conference" requesting three years of funding for a series of meetings.
I am pleased to let you know that we intend to recommend an award that provides funding for the first meeting in the series.

We liked the scientific prospects and likely broader impacts laid out for the first year. Since this is a new conference series, in keeping with past program's practices, we are willing to make a pilot investment at the level of the first year budget, and to welcome a follow up in FY 2015 if the 2014 meeting works well.

In order to proceed with the award recommendation we need a revised budget for one year of funding, at the level requested for the first year. It should be submitted by your Sponsored Research Office.

I also need an abstract. The abstract should have two parts: -a technical description of the project and -a non-technical explanation of the project's broader significance and importance. Please include the title, location and dates of the conference as the first sentence of the abstract, and please provide the http for the current conference website at the end of the abstract.

Abstracts are a public record of active and expired awards and are an important source of information on NSF activities. The purpose of the Abstract is to describe the project and justify the expenditure of Federal funds. Abstracts must not contain inappropriate or confidential information, and because they are available to such a wide audience, high standards of quality must be maintained in preparing them. Upon award of a proposal, the Abstract is available in the Award Search application and via FastLane.

Please, send me your abstract pasted inside a simple email message.

I should add that this is not an official announcement of an award. We can only recommend that an award be made. The official award itself is made by the Division of Grants and Agreements.

As soon as I receive an abstract from you and the revised budget from the Sponsored Research Office I will initiate the paperwork that will result in an official award announcement. It will take an additional four to six weeks for the processing to be completed.

With best wishes and congratulations,
Joanna

Dr. Joanna Kania-Bartoszynska
Program Director
Geometric Analysis and Topology
Division of Mathematical Sciences
National Science Foundation

Subject: Fwd: DOE review and comments
From: Nickolas Solomey <nsolomey@gmail.com>
Date: 03/20/2015 01:49 PM
To: Tom DeLillo <delillo@math.wichita.edu>

Here are the 4 reviewers comments, there are lots of nice things to cut out if you want.

---------- Forwarded message ----------
From: **Nickolas Solomey** <nsolomey@gmail.com>
Date: Thursday, February 26, 2015
Subject: DOE review and comments
To: "Meyer, Holger" <holger.meyer@wichita.edu>, "Muether, Mathew" <Mathew.Muether@wichita.edu>

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Title ImageView Reviews

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0000215097: Wichita State University, Wichita, Kansas

PI: Solomey, Nick
Proposal Title: Experimental Neutrino Particle Physics Program
Solicitation: DE-FOA-0001140 - FY 2015 Research Opportunities in High Energy Physics
Reviewer Category: Primary

- By Reviewer - Current Tab

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Reviewer 1

Criteria

1. Scientific and/or Technical Merit of the proposed effort

What is the scientific innovation of proposed research?

How does the proposed research compare with other research in its field, both in terms of scientific and/or technical merit and originality?

How might the results of the proposed research impact the direction, progress, and thinking in relevant scientific fields of research?

What is the likelihood of achieving influential results?

I am somewhat surprised that nobody in the group appears to be directly involved in the oscillation analyses themselves as this is clearly the most exciting part of Nova. That being said, these analyses obviously require good understanding of beam and detector to be successful, so the group's research still impacts Nova's results (and by proxy perhaps neutrino mass ordering and CP violation) in a major way.

2. Appropriateness of the Proposed Method or Approach

Does the proposed effort employ innovative concepts or methods?

How logical and feasible are the approaches?

Are the conceptual framework, methods, and analyses well justified, adequately developed, and likely to lead to scientifically valid conclusions?

Does the applicant recognize significant potential problems and consider alternative strategies?

The approaches chosen seem reasonable to me. Having no previous Kaon physics experience I am not really in a good position to discuss the merits of a near-perfect tag at production, but it should be helpful. Application of the LEM analysis to the near detector is straight-forward and should help. The transfer matrix technique is also well established. No details are given regarding the neutrino cross section measurements of the near detectors, but I don't foresee unsolvable problems.

3. Competency of Applicant's Personnel and Adequacy of Proposed Resources

Does the proposed work take advantage of unique facilities and capabilities?

What is the past performance of the team?

How well qualified is the team to carry out the proposed work?

Are any proposed plans for recruiting any additional scientific and/or technical personnel including new senior staff, students and postdocs reasonable, justified, and appropriate?

Are the environment and facilities adequate for performing the proposed effort?

Are the senior investigator(s) or any members of the research group that are being reviewed leaders within the proposed effort(s) and/or potential future leaders in the field?

For senior investigator(s) proposing to work across multiple research thrusts, are the plans for such cross-cutting efforts reasonably developed and will the proposed activities have impact?
I have no reason to doubt the brilliance of the personnel, and given their previous experience with MIPP I think they are able to perform the proposed program.

4. Reasonableness and Appropriateness of the Proposed Budget

Are the proposed budget and staffing levels adequate to carry out the proposed work?

Are all travel, student costs, and other ancillary expenses adequately estimated and justified?

Is the budget reasonable and appropriate for the scope?

I think the program would profit from more graduate students as there is only one (Fermilab-resident) post-doc. I am rather surprised by the large travel budget as Wichita is not so far from Fermilab (about 700 miles), and Batavia/Geneva/Naperville is not a very expensive area.[Redacted]

5. Relevance of The Proposed Research to the Mission of DOE Office of HEP Program
How does the proposed research of each senior investigator contribute to the mission, science goals and programmatic priorities of the subprogram in which the application is being evaluated?

Is the proposed research consistent with HEP's overall mission and priorities?

For multi-thrust proposals, does the scope of the full proposed program provide synergy or additional *benefits to the HEP mission beyond the individual thrusts?*

How likely is the research to impact the mission or direction of the overall HEP program?

For senior investigator(s) proposing to work and/or transition across multiple research thrusts during the project period, will their overall efforts add value in the context of HEP program goals and mission?

Work on Nova is of course a central contribution to DoE's HEP mission since it is currently the leading experiment in U.S. neutrino physics. A role in the far detector analysis would further strengthen the proposal.

6. Accomplishments and Plans of Each Senior Investigator

The scientific merit and potential impact of the senior investigator's proposed work

The competency of senior investigator's team and likelihood of success

A comparison to other senior investigators working in the same research area

Prof. Solomey: In his role as MIPP co-spokesperson he is well positioned to lead analysis understanding the neutrino beam which is critical of an oscillation experiment of this type. Since the knowledge of neutrino cross section is poor, precision cross section measurements at the near detector are alway a good idea. The most innovative part of his research appears to be the tagged production of strange mesons.

Prof. Muether: He concentrates on understanding the detectors which is also quite important The transfer matrix to the far detector is a central element in an neutrino oscillation experiment. I can't really comment on any nuclear physics topics related to the near detector, but I am at least somewhat familiar with the axial mass mystery that seems to depend on q^2, so further studies there should be helpful.

Prof. Meyer: His main contribution appears to be also MIPP, but he's also involved in the near detector analysis and will contribute to the proposed test beam analysis. I think it would be good if he also adopted a more leading role in the near-detector LEM analysis and not only "oversee the technical aspects" to make his physics contribution clearer.

Overall Summary of the Proposal

Summary Comments:	This is a modest-size proposal focussed on only Nova (and MIPP) and perhaps the stronger for it. It appears to cover all aspects of Nova and complements it with research on particle production in the Nova beam as well as systematic studies of the Nova (-like) detector response in a test beam. The analysis effort is for the Nova near detector appears and the no-oscillation prediction of the far detector.

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Reviewer 2

Criteria

1. Scientific and/or Technical Merit of the proposed effort

What is the scientific innovation of proposed research?

How does the proposed research compare with other research in its field, both in terms of scientific and/or technical merit and originality?

How might the results of the proposed research impact the direction, progress, and thinking in relevant scientific fields of research?

What is the likelihood of achieving influential results?

The group plans to continue participating in Nova, continue with MIPP analysis and possibly be involved in a Nova beam-test. The MIPP analysis is quite important for future long-baseline neutrino experiments. There is potential impact here, beyond simply participating in an experiment.

2. Appropriateness of the Proposed Method or Approach

Does the proposed effort employ innovative concepts or methods?

How logical and feasible are the approaches?

Are the conceptual framework, methods, and analyses well justified, adequately developed, and likely to lead to scientifically valid conclusions?

Does the applicant recognize significant potential problems and consider alternative strategies?

Some of the analysis ideas on Nova do not seem feasible, though perhaps if they were more completely described and backed up with simulation, their viability would be more clear.
The MIPP work is quite important.

3. Competency of Applicant's Personnel and Adequacy of Proposed Resources

Does the proposed work take advantage of unique facilities and capabilities?

What is the past performance of the team?

How well qualified is the team to carry out the proposed work?

Are any proposed plans for recruiting any additional scientific and/or technical personnel including new senior staff, students and postdocs reasonable, justified, and appropriate?

Are the environment and facilities adequate for performing the proposed effort?

Are the senior investigator(s) or any members of the research group that are being reviewed leaders within the proposed effort(s) and/or potential future leaders in the field?

For senior investigator(s) proposing to work across multiple research thrusts, are the plans for such cross-cutting efforts reasonably developed and will the proposed activities have impact?

The team is competent and capable.

4. Reasonableness and Appropriateness of the Proposed Budget

Are the proposed budget and staffing levels adequate to carry out the proposed work?

Are all travel, student costs, and other ancillary expenses adequately estimated and justified?

Is the budget reasonable and appropriate for the scope?

The travel costs seem out of line.

5. Relevance of The Proposed Research to the Mission of DOE Office of HEP Program

How does the proposed research of each senior investigator contribute to the mission, science goals and programmatic priorities of the subprogram in which the application is being evaluated?

Is the proposed research consistent with HEP's overall mission and priorities?

For multi-thrust proposals, does the scope of the full proposed program provide synergy or additional benefits to the HEP mission beyond the individual thrusts?

How likely is the research to impact the mission or direction of the overall HEP program?

For senior investigator(s) proposing to work and/or transition across multiple research thrusts during the project period, will their overall efforts add value in the context of HEP program goals and mission?

The work is relevant to the mission.

6. Accomplishments and Plans of Each Senior Investigator

The scientific merit and potential impact of the senior investigator's proposed work

The competency of senior investigator's team and likelihood of success

A comparison to other senior investigators working in the same research area

The team is scientifically competent.

Overall Summary of the Proposal

Summary Comments: The group has experience pushing forward analysis in MIPP. This is quite important. The possible contribution of computing power is nice.

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Reviewer 3

Criteria

1. Scientific and/or Technical Merit of the proposed effort

What is the scientific innovation of proposed research?

How does the proposed research compare with other research in its field, both in terms of scientific and/or technical merit and originality?

How might the results of the proposed research impact the direction, progress, and thinking in relevant scientific fields of research?

What is the likelihood of achieving influential results?

This proposal describes work on NOvA and MIPP by the WSU group. Faculty members Solomey and Meyer are involved in the MIPP experiment, which has not taken data for a long time, but which has a large data set on tape still waiting to be analyzed. A new hire, Muether, intends to continue work on NOvA, and both other faculty members propose to participate in NOvA as well. The proposal also briefly mentions possible future involvement in LBNF.

NOvA has considerable intrinsic merit, as a leading current US experiment in the field. Data-taking is just starting up and has several future impactful results ahead of it, including new electron-appearance-based measurements of theta13 with an off-axis beam.

MIPP is a support-type experiment with the aim of measuring charged-particle distributions with beams at Fermilab. In principle these data are useful for understanding properties of neutrino beams. However the collaboration has been rather slow in producing results and few papers have been published, and only after long delay. It would be nice to see MIPP data analyzed.

2. Appropriateness of the Proposed Method or Approach

Does the proposed effort employ innovative concepts or methods?

How logical and feasible are the approaches?

Are the conceptual framework, methods, and analyses well justified, adequately developed, and likely to lead to scientifically valid conclusions?

Does the applicant recognize significant potential problems and consider alternative strategies?

The strongest aspect of this proposal is the service work to NOvA proposed to be done by Muether, including data quality monitoring. Given his recent involvement at Fermilab, it's plausible this can be carried out well. Also proposed are near detector data analyses; the details of how this work will be carried out are not well fleshed out. The group proposes to take on shift and other support work.

A possible atmospheric tau neutrino analysis is mentioned; however the description contains an erroneous statement (tau appearance was not recently demonstrated by T2K), betraying the investigator's unfamiliarity with the analysis. A specific plan for this analysis is not described.

Exactly how the MIPP analysis, and possible NOvA test beam analysis (if the test beam happens) are to be carried out is not described.

3. Competency of Applicant's Personnel and Adequacy of Proposed Resources

Does the proposed work take advantage of unique facilities and capabilities?

What is the past performance of the team?

How well qualified is the team to carry out the proposed work?

Are any proposed plans for recruiting any additional scientific and/or technical personnel including new senior staff, students and postdocs reasonable, justified, and appropriate?

Are the environment and facilities adequate for performing the proposed effort?

Are the senior investigator(s) or any members of the research group that are being reviewed leaders within the proposed effort(s) and/or potential future leaders in the field?

For senior investigator(s) proposing to work across multiple research thrusts, are the plans for such cross-cutting efforts reasonably developed and will the proposed activities have impact?
While Solomey is co-spokesperson of MIPP, the researchers are not really leaders in the field-- the MIPP experiment has the reputation of being extremely slow to produce results (for the publication on charged pion production yields which finally showed up this year, it is not clear what the WSU contribution is).

Although their track record is not very strong, the group members are qualified to carry out the proposed work. The recent hire, Muether, was recently a Fermilab postdoc working on NOvA and appears best positioned to make a contribution to NOvA.

The request represents significant new personnel for the group (a postdoc, a grad student and two undergrads). While this would not be unreasonable for a group of this size, it's not clear funds would be optimally spent in this group without much advising record.

The facilities seem to be adequate.

4. Reasonableness and Appropriateness of the Proposed Budget

Are the proposed budget and staffing levels adequate to carry out the proposed work?

Are all travel, student costs, and other ancillary expenses adequately estimated and justified?

Is the budget reasonable and appropriate for the scope?

For the items requested, the budget is not too unreasonable, although the foreign travel seems rather high for a group doing research at Fermilab. As indicated above, it's not clear the large personnel increase is warranted for this group.

5. Relevance of The Proposed Research to the Mission of DOE Office of HEP Program
How does the proposed research of each senior investigator contribute to the mission, science goals and programmatic priorities of the subprogram in which the application is being evaluated?

Is the proposed research consistent with HEP's overall mission and priorities?

For multi-thrust proposals, does the scope of the full proposed program provide synergy or additional benefits to the HEP mission beyond the individual thrusts?

How likely is the research to impact the mission or direction of the overall HEP program?

For senior investigator(s) proposing to work and/or transition across multiple research thrusts during the project period, will their overall efforts add value in the context of HEP program goals and mission?

The proposed research is entirely relevant to the mission and priorities of HEP.

6. Accomplishments and Plans of Each Senior Investigator
The scientific merit and potential impact of the senior investigator's proposed work

The competency of senior investigator's team and likelihood of success

A comparison to other senior investigators working in the same research area

Solomey is a PI with some expertise but without a very strong track record of research or advising students. Although spokesperson of MIPP, it is not even clear his, or the WSU group's, role, and the experiment has been disappointingly slow in producing results.

Meyer is a PI with some expertise but without a very strong track record of research or advising students. The proposal is light on specifics of proposed research and weak compared to others proposing similar research.

Muether is a new hire and the most promising member of the WSU, having recent track record of contributions to NOvA as a postdoc. The proposal to develop and maintain data quality tools is the strongest element of this overall rather weak proposal.

Overall Summary of the Proposal

Summary Comments: The proposal is light on specifics of proposed research and weak compared to others proposing similar research.

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Reviewer 4

Criteria

1. Scientific and/or Technical Merit of the proposed effort

What is the scientific innovation of proposed research?

How does the proposed research compare with other research in its field, both in terms of scientific and/or technical merit and originality?

How might the results of the proposed research impact the direction, progress, and thinking in relevant scientific fields of research?

What is the likelihood of achieving influential results?

The WSU group is proposing a 3-year research effort supported by 3 senior investigators focused on NOvA near detector analysis and a proposed test beam run. The NOvA near detector is now fully operational and will collect a very large sample of neutrino interactions in the 2 GeV energy range. The analysis of this data is crucial for the NOvA neutrino oscillation program and in advancing our understanding of nuclear effects in neutrino scattering. If the WSU group can provide a strong team leading analysis of the NOvA near detector data, this could have a substantial impact on the NOvA program. WSU's support of the test beam run and analysis of MIPP data taken on the NuMI target could enhance this effort, although a coherent analysis plan for these 3 programs was not presented. How is this all connected and how do each of the research efforts strengthen each other?

2. Appropriateness of the Proposed Method or Approach

Does the proposed effort employ innovative concepts or methods?

How logical and feasible are the approaches?

Are the conceptual framework, methods, and analyses well justified, adequately developed, and likely to lead to scientifically valid conclusions?

Does the applicant recognize significant potential problems and consider alternative strategies?

The PIs propose to build a team that will focus on measurements in the NOvA near detector. This effort is incredibly important and will provide valuable, high statistics datasets for analysis.

Near Detector (Solomey): proposes to explore neutrino-induced kaon production in the near detector. There is very little existing data on neutrino-induced kaon production so adding to this collection would be valuable. Specifically, the PI proposes to search for antineutrino-induced K- vs. K0bar production. Such events are proposed to be tagged based on the number of particles emitted from the interaction vertex. While the simple final states expressed in equations (1) and (2) are true for free nucleon scattering, nuclear effects greatly alter this picture. How will the carbon target present in NOvA modify this picture and the event selection being proposed? What do such events look like in the NOvA detector? Some example event displays of simulated K- and K0bar events would have been useful. The PI points out that "if a few thousand of these events can be found, there is the potential to do some interesting physics of the K0 oscillation mechanism", but does not state how many events might be expected in a reasonable NOvA beam exposure. The analysis uses antineutrino reactions. Will this study be done in neutrino and/or antineutrino mode running? The PI mentions "even though there is a small amount of antineutrinos in the beam of NuMI, because we would see a negative lepton (muon or electron), we then know that it was a neutrino that produced the K0 particle". The NOvA detector is not magnetized so it would have been helpful to explain how one will separate neutrino from antineutrino events for this study. Also, a reference should be included for the source of existing data on numubar p —> mu+ K- p in Equation (1) given that this sample is referred to twice in the text.

Near Detector (Muether): proposes to continue work on understanding the off-axis NuMI flux. This is crucial for any cross section measurements that are to be obtained from the near detector. Profs. Muether and Meyer also propose to measure the axial mass (MA) in quasi-elastic interactions in the NOvA near detector. The study of quasi-elastic scattering is an incredibly important avenue of research given the newly appreciated nuclear effects involved in such interactions and the role they play in the interpretation of neutrino oscillation data. The field needs more data to make sense of the current picture and the narrowly peaked off-axis NuMI flux provides a unique opportunity to scrutinize these events without the added complication of a very wide spectrum of participating neutrino energies. However, the analysis description is behind the times. The PIs are encouraged to focus on producing a less model-dependent physics result from this data than MA. Recent neutrino experiments, such as MiniBooNE, ArgoNeuT, T2K, MINERvA, etc. have instead concentrated on measuring the differential cross sections for the final state particles produced in such quasi-elastic interactions rather than axial mass extractions. This approach invokes less model assumptions and produces a more comprehensive set of data (not just a single number) that can be directly used by nuclear theorists and model builders to advance our understanding of the complex nuclear physics in play. Muether's added interest in initiating an atmospheric tau neutrino analysis in the NOvA far detector is intriguing. It would be more cohesive if there were a connection between this and the near detector program. For example, are there backgrounds or techniques for the tau neutrino search that can be specifically constrained using NOvA near detector data?

MIPP (Solomey/Meyer): The statement on planned MIPP analyses is vague. Who will be specifically working on this beyond oversight of ongoing work and what is the timeline for results? The MIPP data is valuable for a variety of reasons, yet it is unclear from the proposal whether WSU plans to contribute any WSU postdocs or students to the analysis of this data. With their close involvement in MIPP and the availability of hadro-production data on the NuMI target, the WSU group could advance the state of knowledge of the NuMI off-axis flux that would support the neutrino cross section program they propose. This seems like a missed opportunity.

Testbeam (Meyer/Muether): The WSU group is involved in plans to expose a prototype of the NOvA detector in the Fermilab test beam facility. They have considerable input to lend to this effort given Muether's expertise on the NOvA detector and Meyer's extensive experience on MIPP. This would also give valuable hands-on detector experience to their students. The description of what WSU would like to obtain from the test beam run, however, is very general. The proposal would have been stronger had the test beam run been connected to their planned near and far detector measurements. For example, what can be learned on kaons and protons in the proposed test beam exposure that would enhance the planned K0 and quasi-elastic near detector measurements, respectively? The test beam analysis plan is lacking specifics. What does the team want to get out of the testbeam and are they pushing for specific measurements that will enhance their NOvA near detector analyses?

The team presents two plans depending on the timeline for the NOvA test beam run. If the test beam run is delayed for some reason, focus will shift on NOvA far detector analyses. It is important to articulate this alternate plan, but it is not clear what "Additional Service" means in years 3,4 on the timeline on pages 7,8 or what far detector work the group will pursue (beyond Muether's atmospheric tau neutrino search) if the test beam run is pushed back in time and/or the new WSU computing core for LEM transfer is not realized.

3. Competency of Applicant's Personnel and Adequacy of Proposed Resources

Does the proposed work take advantage of unique facilities and capabilities?

What is the past performance of the team?

How well qualified is the team to carry out the proposed work?

Are any proposed plans for recruiting any additional scientific and/or technical personnel including new senior staff, students and postdocs reasonable, justified, and appropriate?

Are the environment and facilities adequate for performing the proposed effort?

Are the senior investigator(s) or any members of the research group that are being reviewed leaders within the proposed effort(s) and/or potential future leaders in the field?

For senior investigator(s) proposing to work across multiple research thrusts, are the plans for such cross-cutting efforts reasonably developed and will the proposed activities have impact?

Prof. Solomey is currently spokesperson of MIPP and will continue in this role. Prof. Meyer was previously commissioning and run coordinator for MIPP and could led valuable expertise to the proposed NOvA test beam run. In addition to the quasi-elastic measurement outlined above, Prof. Meyer also plans to continue to support the NOvA beam spill system, however it seems this role could easily be passed on to the WSU postdoc or graduate student who will be based at Fermilab. Neither seem to have a strong track record of mentoring students and MIPP has been very visibly slow in producing results.

Prof. Muether possesses an established and visible role on NOvA being a member of the NOvA executive committee and having been a former run coordinator for the experiment. He is a DAQ expert and is one of two qualified APD experts on NOvA. He will continue to lead the NOvA data quality effort. Getting students involved with the watchdog group would provide excellent training. He seems very well-suited to lead a NOvA near detector analysis team given his expert knowledge of NOvA. He appears best situated to make future contributions to NOvA.

The proposed research would leverage a new $226k 300+ core computing center that is in the WSU president's request to the state of Kansas. The proposal does not state how successful the realization of this new computing cluster is likely to be. If this second site is established at WSU, the LEM techniques could be readily extended to the planned near detector analyses and provide extra computing prowess for reprocessing NOvA data sets.

4. Reasonableness and Appropriateness of the Proposed Budget

Are the proposed budget and staffing levels adequate to carry out the proposed work?

Are all travel, student costs, and other ancillary expenses adequately estimated and justified?

Is the budget reasonable and appropriate for the scope?

The PI requests support for 2 summer months each year for Profs. Solomey, Meyer, and Muether, as well as one postdoc, one graduate student, and two undergraduates who will work on NOvA for the duration of the proposed research. As for the requested funding, two aspects of the proposed budget raise questions. (1) The proposed travel budget is large at a total cost of ~$50k/year. The expense is dominated by the need for 24 week-long trips to Fermilab per year for NOvA shift support and collaboration with other members of the NOvA team. There must be a more optimal schedule than traveling to Fermilab every other week (!). It is unclear why this is needed when the

WSU postdoc and graduate student will be based at Fermilab (and can provide local support) and when a remote shift facility at WSU is planned for early 2015. (2) The $15,608 budgeted for personal computing is not itemized - how many computers does this include, for which personnel, and on what timescale?

5. Relevance of The Proposed Research to the Mission of DOE Office of HEP Program

How does the proposed research of each senior investigator contribute to the mission, science goals and programmatic priorities of the subprogram in which the application is being evaluated?

Is the proposed research consistent with HEP's overall mission and priorities?

For multi-thrust proposals, does the scope of the full proposed program provide synergy or additional benefits to the HEP mission beyond the individual thrusts?

How likely is the research to impact the mission or direction of the overall HEP program?

For senior investigator(s) proposing to work and/or transition across multiple research thrusts during the project period, will their overall efforts add value in the context of HEP program goals and mission?

The proposed work is within the DOE OHEP's mission to further elucidate the properties of neutrinos by sending accelerator-based sources of neutrinos across long distances. NOvA is the flagship experiment in the U.S.-based neutrino program. Support for the analysis of the substantial datasets expected to be collected in the NOvA near detector will be critical to the success of the experiment. There will be a lot of data, many interaction channels, and a lot of complex physics that need to be understood with this device so a strong analysis team should be supported to carry out this work. In addition, a better understanding of the response of the NOvA detector by exposing a prototype to known particle beams will ensure the robustness of results obtained from both the near and far detectors.

6. Accomplishments and Plans of Each Senior Investigator

The scientific merit and potential impact of the senior investigator's proposed work

The competency of senior investigator's team and likelihood of success

A comparison to other senior investigators working in the same research area

Solomey and Meyer are PIs with some expertise, but it is unclear how successful they have been in leading postdocs and students to produce physics results. Muether is a new hire and most promising member of the WSU team, given his established record on NOvA as a postdoc for the past several years.

Overall Summary of the Proposal

Summary Comments: This proposal initiates an analysis team focused on the NOvA near detector and planned test beam run. Both data sets are important for the success of NOvA and will allow us to learn some important nuclear physics in the process. The strength of the proposal is in launching a new team devoted to NOvA near detector analysis. The weakness is the lack of detail and cohesiveness in the planned work. NOvA is currently the flagship neutrino experiment in the U.S. There will be a lot of data in the near detector, a lot of interaction channels, and a lot of complex nuclear physics that needs to be understood so a strong analysis team should be supported to carry out this work. With the new addition of Muether, WSU could, in principle, be that team.

--

Dr. Nickolas Solomey
Professor of Physics

DEPARTMENT OF MATHEMATICS, STATISTICS, AND PHYSICS

2015 SELF-STUDY REPORT

Attachment #3.

Office of Planning and Analysis data.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Math

Tables 1 through 7 provide data for Section 2 of the Program Review Self Study Template.

Table 1: Fiscal Year Summation of Student Credit Hour (SCH) Production

Course level:	Fiscal Year (summer-fall-spring sequence) 2008	2009	2010	2011	2012	2013	2014	Rolling 5 FY average 2008-2012	2009-2013	2010-2014
Total	27,155	29,409	31,525	32,200	31,957	33,305	33,012	30,449	31,679	32,400
100-299	16,851	18,502	20,122	21,287	21,409	23,006	21,734	19,634	20,865	21,512
300-499	5,656	5,955	6,363	6,460	5,890	5,689	6,558	6,065	6,071	6,192
500-699	3,914	4,265	4,331	3,745	4,055	3,935	3,986	4,062	4,066	4,010
700-799	464	371	457	390	261	399	440	389	376	389
800-899	131	187	178	214	215	148	217	185	188	194
900-999	139	129	74	104	127	128	77	115	112	102

note: SCH of all enrolled department offerings summated by FY for each census day; in some cases department level SCH includes entire department offerings.

Table 2: Student Credit Hour (SCH) Production at Fall Census Day

Course level:	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Total	12,567	13,690	14,843	14,748	14,830	15,135	15,793	14,136	14,649	15,070
100-299	8,021	9,003	9,699	9,801	9,986	10,480	10,937	9,302	9,794	10,181
300-499	2,664	2,697	2,974	2,944	2,909	2,650	2,777	2,838	2,835	2,851
500-699	1,568	1,653	1,797	1,606	1,606	1,656	1,689	1,646	1,664	1,671
700-799	197	216	288	282	213	255	291	239	251	266
800-899	61	59	66	56	46	32	60	58	52	52
900-999	56	62	19	59	70	62	39	53	54	50

note: SCH of all enrolled department offerings at Fall census day.

Table 3: Student Credit Hour (SCH) Production among Department Instructional Faculty on November Employee Census Day (entire term SCH)

Employee type:	Year of November Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Program total	n/a	10,982	12,402	11,787	14,199	14,230	15,401	n/a	12,720	13,604
Tenure eligible faculty	n/a	3,557	4,534	3,147	5,164	5,190	4,744	n/a	4,318	4,556
Non-tenure eligible faculty	n/a	4,074	4,367	3,626	3,306	2,827	3,705	n/a	3,640	3,566
Lecturers	n/a	1,007	669	1,957	2,603	3,416	3,863	n/a	1,930	2,502
GTA	n/a	2299	2,667	2,856	2,895	2,459	2,858	n/a	2,635	2,747
Unclassified professional	n/a	45	165	201	231	338	231	n/a	196	233
Classified staff	n/a	0	0	0	0	0	0	n/a	0	0
GSA, GRA, UG std	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0

note: faculty/staff with active class assignments and employment at November freeze.; employee type based on ecls and egrp matrix.

Table 4: Instructional FTE Employed on November 1st Census Day

Employee type:	Year of November Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Program total	n/a	47.5	43.5	44.7	51.5	54.3	53.1	n/a	48.3	49.4
Tenure eligible faculty	n/a	22.5	21.5	20.5	26.2	28.4	24.0	n/a	23.8	24.1
Non-tenure eligible faculty	n/a	12.7	10.8	8.8	8.8	8.8	9.8	n/a	9.9	9.4
Lecturers	n/a	3.8	3.2	6.0	7.3	8.4	10.7	n/a	5.8	7.1
GTA	n/a	7.5	7.0	8.5	8.3	7.8	7.6	n/a	7.8	7.8
Unclassified professional	n/a	1	1.0	1.0	1.0	1.0	1.0	n/a	1.0	1.0
Classified staff	n/a	0	0.0	0.0	0.0	0.0	0.0	n/a	0.0	0.0
GSA, GRA, UG std	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0	0.0

note: active employment positions at November 1st freeze; employee type based on ecls and egrp matrix.; fte of 1 based on 80 hour bi-week appointment; employee type based on ecls and egrp matrix; KBOR minima for faculty (TTF) 3 for UG, plus 3 for masters, plus 2 for doctoral.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Math

Table 5a: Student Credit Hour (SCH) by FTE for University Instructional Faculty on November 1st Census Day

	Year of November Census Day							Rolling 5 year average		
Employee type:	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
(University level) Total	n/a	225	247	235	230	222	225	n/a	232	232
Tenure eligible faculty	n/a	213	240	227	216	194	194	n/a	218	214
Non-tenure eligible faculty	n/a	298	329	300	284	289	306	n/a	300	302
Lecturers	n/a	280	287	274	269	295	302	n/a	281	285
GTA	n/a	190	201	214	210	203	206	n/a	203	207
Unclassified professional	n/a	116	121	106	149	122	102	n/a	123	120
Classified staff	n/a	0	0	0	0	14	0	n/a	3	3
GSA, GRA, UG std	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0

note: active employment positions at November 1st freeze.; employee type based on ecls and egrp matrix; instructional defined as active course enrollment.

Table 5b: Student Credit Hour (SCH) by FTE for College Division Instructional Faculty on November 1st Census Day

	Year of November Census Day							Rolling 5 year average		
Employee type:	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
(College Division level) Total	n/a	247	288	252	262	255	250	n/a	261	261
Tenure eligible faculty	n/a	249	296	262	260	249	250	n/a	263	263
Non-tenure eligible faculty	n/a	419	484	493	509	420	424	n/a	465	466
Lecturers	n/a	339	411	336	338	455	405	n/a	375	389
GTA	n/a	119	132	118	127	110	112	n/a	121	120
Unclassified professional	n/a	133	268	157	321	96	71	n/a	195	183
Classified staff	n/a	0	0	0	0	14	0	n/a	3	3
GSA, GRA, UG std	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0

note: active employment positions at November 1st freeze.; employee type based on ecls and egrp matrix; instructional defined as active course enrollment.

Table 5c: Student Credit Hour (SCH) by FTE for Program Instructional Faculty on November 1st Census Day

	Year of November Census Day							Rolling 5 year average		
Employee type:	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
(Program level) Total	n/a	231	285	263	276	262	290	n/a	264	275
Tenure eligible faculty	n/a	158	211	154	197	183	198	n/a	181	188
Non-tenure eligible faculty	n/a	322	406	414	378	323	380	n/a	369	380
Lecturers	n/a	263	206	326	356	407	361	n/a	312	331
GTA	n/a	307	381	336	351	317	377	n/a	338	352
Unclassified professional	n/a	45	165	201	231	338	231	n/a	196	233
Classified staff	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
GSA, GRA, UG std	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0

note: active employment positions at November 1st freeze.; employee type based on ecls and egrp matrix; instructional defined as active course enrollment.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Math

Table 6: Program Majors (including double majors) on Fall Census Day

	Year of Fall Census Day							Rolling 5 year average		
Student Class	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
Total	98	101	108	125	135	114	114	113	117	119
freshmen	9	8	10	10	8	5	6	9	8	8
sophomore	15	14	11	14	12	7	8	13	12	10
junior	14	17	11	27	22	18	19	18	19	19
senior	23	20	34	30	48	44	43	31	35	40
masters	27	27	26	29	30	27	24	28	28	27
post masters	0	0	0	0	0	0	0	0	0	0
doctoral	10	15	16	15	15	13	14	14	15	15
other	0	0	0	0	0	0	0	0	0	0

note: majors include all active program matching majors among 4 possible major codes; other includes guest or non degree students; KBOR minima 25 UG, 20 GR masters and 5 GR doctoral.

Table 7: Degree Production by Fiscal Year

	Fiscal Year (summer-fall-spring sequence)							Rolling 5 FY average		
Degree level:	2008	2009	2010	2011	2012	2013	2014	2008-2012	2009-2013	2010-2014
Total	23	15	10	26	27	24	36	20	20	25
Doctoral	1	1	3	2	3	2	2	2	2	2
Masters	8	8	4	10	5	8	10	7	7	7
Bachelor	14	6	3	14	19	14	24	11	11	15
Associate	0	0	0	0	0	0	0	0	0	0

note: includes all active program matching majors among 4 possible major codes; KBOR minima 10 UG, 5 GR masters & 2 GR doctoral.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Math

Tables 8 provides data for Section 3a of the Program Review Self Study Template.

Table 8: Mean ACT score of Juniors and Seniors Enrolled on Fall Census Day (source=Fall Census Day)

Statistic:	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
University level	22.3	22.5	22.5	22.7	22.8	23.0	23.0	22.6	22.7	22.8
Program majors	25.9	25.2	26.0	25.9	26.1	26.5	26.6	25.9	26.0	26.3
Program majors count	37	37	45	57	70	62	62	49	54	59
reporting ACT	21	23	22	33	38	37	37	27	31	33
Percent reporting	56.8%	62.2%	48.9%	57.9%	54.3%	59.7%	59.7%	55.7%	56.5%	56.4%

note: if ACT missing and SAT available, SAT is used converted to ACT metric; KBOR captures ACT data for enrolled juniors & seniors only; KBOR minima >=20.

Table 9 provides data for Section 3b of the Program Review Self Study Template.

Table 9: Mean Application GPA of Admitted Graduate Student Majors (source= Applications)

Statistic:	Fiscal Year (summer-fall-spring sequence) 2008	2009	2010	2011	2012	2013	2014	Rolling 5 FY weighted average 2008-2012	2009-2013	2010-2014
University level	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Program majors	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Program majors count	24	21	33	22	22	25	26	24	25	26
reporting GR gpa	17	13	23	17	17	15	21	17	17	19
Percent reporting	70.8%	61.9%	69.7%	77.3%	77.3%	60.0%	80.8%	71.3%	69.1%	72.7%

note: graduate student application gpa based on last 60 hours of course work earned.

Table 10 provides data for Section 3d of the Program Review Self Study Template.

Table 10: Satisfaction with Program among Undergraduate and Graduate Students at End of Program Exit

Student level:	Academic Year (fall-spring-summer sequence) 2008	2009	2010	2011	2012	2013	2014	Rolling 5 AY average 2008-2012	2009-2013	2010-2014
University **Undergraduate** level	n/a	n/a	n/a	n/a	79.5%	82.9%	81.4%	n/a	n/a	n/a
College Division Undergraduate level	n/a	n/a	n/a	n/a	74.7%	77.0%	74.4%	n/a	n/a	n/a
Program Undergraduate majors:										
Percent satisfied or very satisfied	n/a	n/a	n/a	n/a	80.0%	69.2%	93.8%	n/a	n/a	n/a
mean	n/a	n/a	n/a	n/a	4.0	3.9	4.1	n/a	n/a	n/a
median	n/a	n/a	n/a	n/a	4	4	4	n/a	n/a	n/a
count	n/a	n/a	n/a	n/a	10	13	16	n/a	n/a	n/a
University **Graduate** level	n/a	n/a	n/a	n/a	80.0%	82.5%	82.1%	n/a	n/a	n/a
College Division Graduates level	n/a	n/a	n/a	n/a	70.0%	85.3%	93.3%	n/a	n/a	n/a
Program Graduate majors:										
Percent satisfied or very satisfied	n/a	n/a	n/a	n/a	100.0%	100.0%	100.0%	n/a	n/a	n/a
mean	n/a	n/a	n/a	n/a	4.8	4.5	4.5	n/a	n/a	n/a
median	n/a	n/a	n/a	n/a	5	5	5	n/a	n/a	n/a
count	n/a	n/a	n/a	n/a	10	11	11	n/a	n/a	n/a

note: primary majors only; data from the Application For Degree Exit Survey; scale of 1 to 5 with 5 being high (very satisfied).

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Math

Tables 11 through Table 15 provide data for Section 4 of the Program Review Self Study Template.

Table 11: Applications, Admits and Enrollment for Undergraduate and Graduate Applicants

	Fiscal Year (summer-fall-spring sequence)							Rolling 5 FY average		
Student level:	2008	2009	2010	2011	2012	2013	2014	2008-2012	2009-2013	2010-2014
Undergraduates:										
Applicants	17	26	28	31	26	24	34	26	27	29
Admitted	15	24	26	29	26	21	34	24	25	27
Census day	10	13	14	16	18	11	15	14	14	15
Graduates:										
Applicants	29	40	31	30	30	36	32	32	33	32
Admitted	22	33	22	22	26	26	22	25	26	24
Census day	16	20	14	19	20	18	13	18	18	17

note: unduplicated count as last record of FY; applicants exclude incomplete or cancelled applications.

Table 12: Percent Under-represented Minorities (URM) on Fall Census Day

	Year of Fall Census Day							Rolling 5 year average		
Student level:	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
University level:										
Freshmen & Sophomores	14.5%	15.0%	15.7%	16.9%	17.8%	18.4%	18.4%	16.0%	16.8%	17.5%
Juniors & Seniors	12.1%	12.3%	13.0%	14.0%	14.8%	15.4%	14.8%	13.2%	13.9%	14.4%
Masters	6.6%	6.8%	7.8%	8.2%	9.7%	11.3%	9.7%	7.8%	8.7%	9.3%
Doctoral	6.9%	6.8%	5.6%	6.6%	5.4%	6.7%	6.5%	6.2%	6.2%	6.2%
College division level:										
Freshmen & Sophomores	11.7%	15.3%	14.2%	14.1%	12.3%	13.0%	16.3%	13.5%	13.8%	14.0%
Juniors & Seniors	9.0%	10.6%	10.3%	12.3%	14.3%	13.3%	13.2%	11.3%	12.2%	12.7%
Masters	0.0%	2.3%	2.4%	5.7%	5.8%	4.8%	8.1%	3.2%	4.2%	5.4%
Doctoral	2.7%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.5%	0.0%
Program level:										
Freshmen & Sophomores	8.3%	18.2%	9.5%	8.3%	20.0%	0.0%	0.0%	12.9%	11.2%	7.6%
Juniors & Seniors	13.5%	16.2%	17.8%	8.8%	11.4%	12.9%	6.5%	13.5%	13.4%	11.5%
Masters	0.0%	3.7%	0.0%	10.3%	10.0%	11.1%	12.5%	4.8%	7.0%	8.8%
Doctoral	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

note: includes all active program matching majors among 4 possible major codes; URM includes black non-hispanic, hispanic, american indian/alaskan native & hawaiian.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Math

Table 13: Race/Ethnicity on Fall Census Day

		Year of Fall Census Day						Rolling 5 year average		
Student level:	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
Total	98	101	108	125	135	114	114	113	117	119
Total URM	7	11	10	10	15	11	7	11	11	11
Freshmen & Sophomores Total	24	22	21	24	20	12	14	22	20	18
white non-hispanic	19	16	14	16	12	9	12	15	13	13
black non-hispanic	1	2	2	1	3	0	0	2	2	1
hispanic	1	1	0	0	0	0	0	0	0	0
asian non-hispanic	1	1	1	1	0	0	0	1	1	0
american indian/alaskan native	0	1	0	1	0	0	0	0	0	0
foreign	1	1	4	4	3	2	1	3	3	3
hawaiian	0	0	0	0	1	0	0	0	0	0
multiple race	0	0	0	1	0	1	1	0	0	1
unknown	1	0	0	0	1	0	0	0	0	0
Juniors & Seniors Total	37	37	45	57	70	62	62	49	54	59
white non-hispanic	28	22	30	38	46	46	48	33	36	42
black non-hispanic	2	2	4	2	5	4	1	3	3	3
hispanic	2	3	2	1	2	3	1	2	2	2
asian non-hispanic	3	5	2	4	4	0	2	4	3	2
american indian/alaskan native	1	1	2	2	1	0	1	1	1	1
foreign	1	1	3	7	8	4	4	4	5	5
hawaiian	0	0	0	0	0	1	1	0	0	0
multiple race	0	0	1	1	2	1	1	1	1	1
unknown	0	3	1	2	2	3	3	2	2	2
Master Total	27	27	26	29	30	27	24	28	28	27
white non-hispanic	16	15	18	15	17	17	15	16	16	16
black non-hispanic	0	0	0	1	0	0	1	0	0	0
hispanic	0	1	0	2	2	2	1	1	1	1
asian non-hispanic	1	3	1	2	3	3	3	2	2	2
american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
foreign	9	7	5	7	5	3	3	7	5	5
hawaiian	0	0	0	0	1	1	1	0	0	1
multiple race	0	0	1	1	0	0	0	0	0	0
unknown	1	1	1	1	2	1	0	1	1	1
Doctoral Total	10	15	16	15	15	13	14	14	15	15
white non-hispanic	5	8	9	9	8	6	5	8	8	7
black non-hispanic	0	0	0	0	0	0	0	0	0	0
hispanic	0	0	0	0	0	0	0	0	0	0
asian non-hispanic	0	0	0	0	1	1	1	0	0	1
american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
foreign	5	7	7	6	6	6	7	6	6	6
hawaiian	0	0	0	0	0	0	0	0	0	0
multiple race	0	0	0	0	0	0	0	0	0	0
unknown	0	0	0	0	0	0	1	0	0	0

note: includes all active program matching majors among 4 possible major codes.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Math

Table 14: Percent Under-represented Minorities (URM) of Degreed Conferred Students by Fiscal Year

Degree level:	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
	Year of Fall Census Day							Rolling 5 year average		
University level:										
Doctoral	1.5%	7.2%	6.1%	6.3%	6.5%	6.5%	4.7%	5.5%	6.5%	6.0%
Masters	6.0%	6.4%	6.1%	6.4%	8.7%	10.5%	9.9%	6.7%	7.6%	8.3%
Bachelor	10.7%	11.3%	11.0%	12.0%	12.7%	12.7%	13.3%	11.5%	11.9%	12.3%
Associate	13.8%	11.8%	16.0%	18.8%	18.4%	21.2%	26.7%	15.8%	17.2%	20.2%
College division level:										
Doctoral	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.6%	5.0%	0.0%
Masters	0.0%	0.0%	7.7%	5.0%	3.7%	6.5%	9.1%	3.3%	4.6%	6.4%
Bachelor	8.5%	14.8%	7.9%	6.4%	11.0%	7.7%	11.7%	9.7%	9.6%	8.9%
Associate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Program level:										
Doctoral	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Masters	0.0%	0.0%	25.0%	10.0%	0.0%	12.5%	20.0%	7.0%	9.5%	13.5%
Bachelor	14.3%	16.7%	33.3%	7.1%	15.8%	7.1%	8.3%	17.4%	16.0%	14.3%
Associate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

note: includes all active program matching majors among 4 possible major codes; URM includes black non-hispanic, hispanic, american indian/alaskan native & hawaiian.

Table 15: Race/Ethnicity of Degreed Conferred Students by Fiscal Year

Degree level:	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
	Year of Fall Census Day							Rolling 5 year average		
Total	23	15	10	26	27	24	36	20	20	25
Total URM	2	1	2	2	3	2	4	2	2	3
Doctoral Total	1	1	3	2	3	2	2	2	2	2
white non-hispanic	1	0	2	0	2	1	1	1	1	1
black non-hispanic	0	0	0	0	0	0	0	0	0	0
hispanic	0	0	0	0	0	0	0	0	0	0
asian non-hispanic	0	0	0	0	0	0	0	0	0	0
american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
foreign	0	1	1	2	1	1	1	1	1	1
hawaiian	0	0	0	0	0	0	0	0	0	0
multiple race	0	0	0	0	0	0	0	0	0	0
unknown	0	0	0	0	0	0	0	0	0	0
Masters Total	8	8	4	10	5	8	10	7	7	7
white non-hispanic	6	4	3	8	3	4	6	5	4	5
black non-hispanic	0	0	0	1	0	0	0	0	0	0
hispanic	0	0	1	0	0	1	1	0	0	1
asian non-hispanic	1	0	0	0	0	1	0	0	0	0
american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
foreign	1	4	0	1	2	1	2	2	2	1
hawaiian	0	0	0	0	0	0	1	0	0	0
multiple race	0	0	0	0	0	0	0	0	0	0
unknown	0	0	0	0	0	1	0	0	0	0

(Table continued on next page)

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Math

(Table 15 continued)

Degree level:		Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Bachelor	Total	14	6	3	14	19	14	24	11	11	15
	white non-hispanic	10	5	1	11	13	7	19	8	7	10
	black non-hispanic	0	1	1	0	1	1	1	1	1	1
	hispanic	2	0	0	1	1	0	1	1	0	1
	asian non-hispanic	0	0	0	1	1	1	0	0	1	1
	american indian/alaskan native	0	0	0	0	1	0	0	0	0	0
	foreign	1	0	1	0	1	4	2	1	1	2
	hawaiian	0	0	0	0	0	0	0	0	0	0
	multiple race	0	0	0	0	0	1	0	0	0	0
	unknown	1	0	0	1	1	0	1	1	0	1
Associate	Total	0	0	0	0	0	0	0	0	0	0
	white non-hispanic	0	0	0	0	0	0	0	0	0	0
	black non-hispanic	0	0	0	0	0	0	0	0	0	0
	hispanic	0	0	0	0	0	0	0	0	0	0
	asian non-hispanic	0	0	0	0	0	0	0	0	0	0
	american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
	foreign	0	0	0	0	0	0	0	0	0	0
	hawaiian	0	0	0	0	0	0	0	0	0	0
	multiple race	0	0	0	0	0	0	0	0	0	0
	unknown	0	0	0	0	0	0	0	0	0	0

note: includes all active program matching majors among 4 possible major codes.

Tables 16 provides data for Section 5 of the Program Review Self Study Template.

Table 16: Department Student Credit Hour (SCH) by Student Department Affiliation on Fall Census Day

Major & student level:	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Total	12,567	13,690	14,843	14,748	14,830	15,135	15,793	14,136	14,649	15,070
Program UG majors	292	333	335	445	512	430	389	383	411	422
Program GR majors	240	257	253	287	303	286	288	268	277	283
Non-program majors	12,035	13,100	14,255	14,016	14,015	14,419	15,116	13,484	13,961	14,364
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Program UG major	2.3%	2.4%	2.3%	3.0%	3.5%	2.8%	2.5%	2.7%	2.8%	2.8%
Program GR major	1.9%	1.9%	1.7%	1.9%	2.0%	1.9%	1.8%	1.9%	1.9%	1.9%
Non-program majors	95.8%	95.7%	96.0%	95.0%	94.5%	95.3%	95.7%	95.4%	95.3%	95.3%

note: program majors includes all active program matching majors among 4 possible major codes.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Physics

Tables 1 through 7 provide data for Section 2 of the Program Review Self Study Template.

Table 1: Fiscal Year Summation of Student Credit Hour (SCH) Production

Course level:	Fiscal Year (summer-fall-spring sequence) 2008	2009	2010	2011	2012	2013	2014	Rolling 5 FY average 2008-2012	2009-2013	2010-2014
Total	27,155	29,409	31,525	32,200	31,957	33,305	33,012	30,449	31,679	32,400
100-299	16,851	18,502	20,122	21,287	21,409	23,006	21,734	19,634	20,865	21,512
300-499	5,656	5,955	6,363	6,460	5,890	5,689	6,558	6,065	6,071	6,192
500-699	3,914	4,265	4,331	3,745	4,055	3,935	3,986	4,062	4,066	4,010
700-799	464	371	457	390	261	399	440	389	376	389
800-899	131	187	178	214	215	148	217	185	188	194
900-999	139	129	74	104	127	128	77	115	112	102

note: SCH of all enrolled department offerings summated by FY for each census day; in some cases department level SCH includes entire department offerings.

Table 2: Student Credit Hour (SCH) Production at Fall Census Day

Course level:	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Total	12,567	13,690	14,843	14,748	14,830	15,135	15,793	14,136	14,649	15,070
100-299	8,021	9,003	9,699	9,801	9,986	10,480	10,937	9,302	9,794	10,181
300-499	2,664	2,697	2,974	2,944	2,909	2,650	2,777	2,838	2,835	2,851
500-699	1,568	1,653	1,797	1,606	1,606	1,656	1,689	1,646	1,664	1,671
700-799	197	216	288	282	213	255	291	239	251	266
800-899	61	59	66	56	46	32	60	58	52	52
900-999	56	62	19	59	70	62	39	53	54	50

note: SCH of all enrolled department offerings at Fall census day.

Table 3: Student Credit Hour (SCH) Production among Department Instructional Faculty on November Employee Census Day (entire term SCH)

Employee type:	Year of November Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Program total	n/a	2,503	2,911	2,393	136	309	290	n/a	1,650	1,208
Tenure eligible faculty	n/a	2,301	2,616	2,336	0	0	0	n/a	1,451	990
Non-tenure eligible faculty	n/a	0	0	0	0	0	0	n/a	0	0
Lecturers	n/a	146	269	57	100	259	250	n/a	166	187
GTA	n/a	56	27	0	36	50	40	n/a	34	31
Unclassified professional	n/a	0	0	0	0	0	0	n/a	0	0
Classified staff	n/a	0	0	0	0	0	0	n/a	0	0
GSA, GRA, UG std	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0

note: faculty/staff with active class assignments and employment at November freeze.; employee type based on ecls and egrp matrix.

Table 4: Instructional FTE Employed on November 1st Census Day

Employee type:	Year of November Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Program total	n/a	7.9	7.9	7.1	1.0	0.9	0.6	n/a	5.0	3.5
Tenure eligible faculty	n/a	6.0	6.7	6.7	0.0	0.0	0.0	n/a	3.9	2.7
Non-tenure eligible faculty	n/a	0.0	0.0	0.0	0.0	0.0	0.0	n/a	0.0	0.0
Lecturers	n/a	0.4	0.8	0.5	0.3	0.7	0.4	n/a	0.6	0.6
GTA	n/a	1.5	0.5	0.0	0.7	0.2	0.2	n/a	0.6	0.3
Unclassified professional	n/a	0	0.0	0.0	0.0	0.0	0.0	n/a	0.0	0.0
Classified staff	n/a	0	0.0	0.0	0.0	0.0	0.0	n/a	0.0	0.0
GSA, GRA, UG std	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.0	0.0

note: active employment positions at November 1st freeze; employee type based on ecls and egrp matrix.; fte of 1 based on 80 hour bi-week appointment; employee type based on ecls and egrp matrix; KBOR minima for faculty (TTF) 3 for UG, plus 3 for masters, plus 2 for doctoral.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Physics

Table 5a: Student Credit Hour (SCH) by FTE for University Instructional Faculty on November 1st Census Day

Employee type:	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
	Year of November Census Day							Rolling 5 year average		
(University level) Total	n/a	225	247	235	230	222	225	n/a	232	232
Tenure eligible faculty	n/a	213	240	227	216	194	194	n/a	218	214
Non-tenure eligible faculty	n/a	298	329	300	284	289	306	n/a	300	302
Lecturers	n/a	280	287	274	269	295	302	n/a	281	285
GTA	n/a	190	201	214	210	203	206	n/a	203	207
Unclassified professional	n/a	116	121	106	149	122	102	n/a	123	120
Classified staff	n/a	0	0	0	0	14	0	n/a	3	3
GSA, GRA, UG std	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0

note: active employment positions at November 1st freeze.; employee type based on ecls and egrp matrix; instructional defined as active course enrollment.

Table 5b: Student Credit Hour (SCH) by FTE for College Division Instructional Faculty on November 1st Census Day

Employee type:	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
	Year of November Census Day							Rolling 5 year average		
(College Division level) Total	n/a	247	288	252	262	255	250	n/a	261	261
Tenure eligible faculty	n/a	249	296	262	260	249	250	n/a	263	263
Non-tenure eligible faculty	n/a	419	484	493	509	420	424	n/a	465	466
Lecturers	n/a	339	411	336	338	455	405	n/a	375	389
GTA	n/a	119	132	118	127	110	112	n/a	121	120
Unclassified professional	n/a	133	268	157	321	96	71	n/a	195	183
Classified staff	n/a	0	0	0	0	14	0	n/a	3	3
GSA, GRA, UG std	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0

note: active employment positions at November 1st freeze.; employee type based on ecls and egrp matrix; instructional defined as active course enrollment.

Table 5c: Student Credit Hour (SCH) by FTE for Program Instructional Faculty on November 1st Census Day

Employee type:	2007	2008	2009	2010	2011	2012	2013	2007-2011	2008-2012	2009-2013
	Year of November Census Day							Rolling 5 year average		
(Program level) Total	n/a	316	367	335	135	334	490	n/a	297	332
Tenure eligible faculty	n/a	384	393	351	n/a	n/a	n/a	n/a	226	149
Non-tenure eligible faculty	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Lecturers	n/a	351	347	114	300	346	601	n/a	291	341
GTA	n/a	37	53	n/a	53	286	229	n/a	86	124
Unclassified professional	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Classified staff	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
GSA, GRA, UG std	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0

note: active employment positions at November 1st freeze.; employee type based on ecls and egrp matrix; instructional defined as active course enrollment.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Physics

Table 6: Program Majors (including double majors) on Fall Census Day

Student Class	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Total	18	21	28	35	53	68	57	31	41	48
freshmen	0	6	5	8	9	17	14	6	9	11
sophomore	4	1	5	5	9	13	9	5	7	8
junior	7	5	3	10	13	19	11	8	10	11
senior	7	8	15	11	22	19	23	13	15	18
masters	0	1	0	1	0	0	0	0	0	0
post masters	0	0	0	0	0	0	0	0	0	0
doctoral	0	0	0	0	0	0	0	0	0	0
other	0	0	0	0	0	0	0	0	0	0

note: majors include all active program matching majors among 4 possible major codes; other includes guest or non degree students; KBOR minima 25 UG, 20 GR masters and 5 GR doctoral.

Table 7: Degree Production by Fiscal Year

Degree level:	Fiscal Year (summer-fall-spring sequence) 2008	2009	2010	2011	2012	2013	2014	Rolling 5 FY average 2008-2012	2009-2013	2010-2014
Total	2	2	2	4	5	3	4	3	3	4
Doctoral	0	0	0	0	0	0	0	0	0	0
Masters	0	0	0	0	0	0	0	0	0	0
Bachelor	2	2	2	4	5	3	4	3	3	4
Associate	0	0	0	0	0	0	0	0	0	0

note: includes all active program matching majors among 4 possible major codes; KBOR minima 10 UG, 5 GR masters & 2 GR doctoral.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Physics

Tables 8 provides data for Section 3a of the Program Review Self Study Template.

Table 8: Mean ACT score of Juniors and Seniors Enrolled on Fall Census Day (source=Fall Census Day)

Statistic:	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
University level	22.3	22.5	22.5	22.7	22.8	23.0	23.0	22.6	22.8	22.9
Program majors	27.6	28.6	27.3	28.6	27.8	28.1	28.0	28.0	28.0	28.0
Program majors count	14	13	18	21	35	38	34	20	25	29
reporting ACT	8	8	12	15	20	23	24	13	16	19
Percent reporting	57.1%	61.5%	66.7%	71.4%	57.1%	60.5%	70.6%	62.4%	62.4%	64.4%

note: if ACT missing and SAT available, SAT is used converted to ACT metric; KBOR captures ACT data for enrolled juniors & seniors only; KBOR minima >=20.

Table 9 provides data for Section 3b of the Program Review Self Study Template.

Table 9: Mean Application GPA of Admitted Graduate Student Majors (source= Applications)

Statistic:	Fiscal Year (summer-fall-spring sequence) 2008	2009	2010	2011	2012	2013	2014	Rolling 5 FY weighted average 2008-2012	2009-2013	2010-2014
University level	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Program majors	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Program majors count	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
reporting GR gpa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Percent reporting	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

note: graduate student application gpa based on last 60 hours of course work earned.

Table 10 provides data for Section 3d of the Program Review Self Study Template.

Table 10: Satisfaction with Program among Undergraduate and Graduate Students at End of Program Exit

Student level:	Academic Year (fall-spring-summer sequence) 2008	2009	2010	2011	2012	2013	2014	Rolling 5 AY average 2008-2012	2009-2013	2010-2014
University **Undergraduate** level	n/a	n/a	n/a	n/a	79.5%	82.9%	81.4%	n/a	n/a	n/a
College Division Undergraduate level	n/a	n/a	n/a	n/a	74.7%	77.0%	74.4%	n/a	n/a	n/a
Program Undergraduate majors:										
Percent satisfied or very satisfied	n/a	n/a	n/a	n/a	66.7%	100.0%	100.0%	n/a	n/a	n/a
mean	n/a	n/a	n/a	n/a	4.0	4.0	4.5	n/a	n/a	n/a
median	n/a	n/a	n/a	n/a	4	4	5	n/a	n/a	n/a
count	n/a	n/a	n/a	n/a	3	2	4	n/a	n/a	n/a
University **Graduate** level	n/a	n/a	n/a	n/a	80.0%	82.5%	82.1%	n/a	n/a	n/a
College Division Graduates level	n/a	n/a	n/a	n/a	70.0%	85.3%	93.3%	n/a	n/a	n/a
Program Graduate majors:										
Percent satisfied or very satisfied	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
mean	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
median	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
count	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

note: primary majors only; data from the Application For Degree Exit Survey; scale of 1 to 5 with 5 being high (very satisfied).

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Physics

Tables 11 through Table 15 provide data for Section 4 of the Program Review Self Study Template.

Table 11: Applications, Admits and Enrollment for Undergraduate and Graduate Applicants

Student level:	Fiscal Year (summer-fall-spring sequence) 2008	2009	2010	2011	2012	2013	2014	Rolling 5 FY average 2008-2012	2009-2013	2010-2014
Undergraduates:										
Applicants	15	18	11	23	14	23	20	16	18	18
Admitted	13	14	11	21	13	23	18	14	16	17
Census day	4	5	7	9	7	18	11	6	9	10
Graduates:										
Applicants	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Admitted	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Census day	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

note: unduplicated count as last record of FY; applicants exclude incomplete or cancelled applications.

Table 12: Percent Under-represented Minorities (URM) on Fall Census Day

Student level:	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
University level:										
Freshmen & Sophomores	14.5%	15.0%	15.7%	16.9%	17.8%	18.4%	18.4%	16.0%	16.8%	17.5%
Juniors & Seniors	12.1%	12.3%	13.0%	14.0%	14.8%	15.4%	14.8%	13.2%	13.9%	14.4%
Masters	6.6%	6.8%	7.8%	8.2%	9.7%	11.3%	9.7%	7.8%	8.7%	9.3%
Doctoral	6.9%	6.8%	5.6%	6.6%	5.4%	6.7%	6.5%	6.2%	6.2%	6.2%
College division level:										
Freshmen & Sophomores	11.7%	15.3%	14.2%	14.1%	12.3%	13.0%	16.3%	13.5%	13.8%	14.0%
Juniors & Seniors	9.0%	10.6%	10.3%	12.3%	14.3%	13.3%	13.2%	11.3%	12.2%	12.7%
Masters	0.0%	2.3%	2.4%	5.7%	5.8%	4.8%	8.1%	3.2%	4.2%	5.4%
Doctoral	2.7%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.5%	0.0%
Program level:										
Freshmen & Sophomores	0.0%	0.0%	0.0%	0.0%	0.0%	16.7%	21.7%	0.0%	3.3%	7.7%
Juniors & Seniors	28.6%	23.1%	22.2%	9.5%	11.4%	10.5%	17.6%	19.0%	15.4%	14.3%
Masters	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Doctoral	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

note: includes all active program matching majors among 4 possible major codes; URM includes black non-hispanic, hispanic, american indian/alaskan native & hawaiian.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Physics

Table 13: Race/Ethnicity on Fall Census Day

Student level:	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Total	18	21	28	35	53	68	57	31	41	48
Total URM	4	3	4	2	4	9	11	3	4	6
Freshmen & Sophomores Total	4	7	10	13	18	30	23	10	16	19
white non-hispanic	2	6	8	10	14	19	13	8	11	13
black non-hispanic	0	0	0	0	0	3	1	0	1	1
hispanic	0	0	0	0	0	2	3	0	0	1
asian non-hispanic	0	0	0	0	1	1	1	0	0	1
american indian/alaskan native	0	0	0	0	0	0	1	0	0	0
foreign	1	0	0	2	2	1	2	1	1	1
hawaiian	0	0	0	0	0	0	0	0	0	0
multiple race	0	0	2	1	1	3	2	1	1	2
unknown	1	1	0	0	0	1	0	0	0	0
Juniors & Seniors Total	14	13	18	21	35	38	34	20	25	29
white non-hispanic	8	8	12	19	25	25	20	14	18	20
black non-hispanic	2	2	2	1	3	3	4	2	2	3
hispanic	2	1	2	1	1	1	2	1	1	1
asian non-hispanic	0	0	0	0	1	3	3	0	1	1
american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
foreign	1	1	1	0	4	4	4	1	2	3
hawaiian	0	0	0	0	0	0	0	0	0	0
multiple race	0	0	0	0	1	1	1	0	0	1
unknown	1	1	1	0	0	1	0	1	1	0
Master Total	0	1	0	1	0	0	0	0	0	0
white non-hispanic	0	1	0	1	0	0	0	0	0	0
black non-hispanic	0	0	0	0	0	0	0	0	0	0
hispanic	0	0	0	0	0	0	0	0	0	0
asian non-hispanic	0	0	0	0	0	0	0	0	0	0
american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
foreign	0	0	0	0	0	0	0	0	0	0
hawaiian	0	0	0	0	0	0	0	0	0	0
multiple race	0	0	0	0	0	0	0	0	0	0
unknown	0	0	0	0	0	0	0	0	0	0
Doctoral Total	0	0	0	0	0	0	0	0	0	0
white non-hispanic	0	0	0	0	0	0	0	0	0	0
black non-hispanic	0	0	0	0	0	0	0	0	0	0
hispanic	0	0	0	0	0	0	0	0	0	0
asian non-hispanic	0	0	0	0	0	0	0	0	0	0
american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
foreign	0	0	0	0	0	0	0	0	0	0
hawaiian	0	0	0	0	0	0	0	0	0	0
multiple race	0	0	0	0	0	0	0	0	0	0
unknown	0	0	0	0	0	0	0	0	0	0

note: includes all active program matching majors among 4 possible major codes.

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Physics

Table 14: Percent Under-represented Minorities (URM) of Degreed Conferred Students by Fiscal Year

Degree level:	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
University level:										
Doctoral	1.5%	7.2%	6.1%	6.3%	6.5%	6.5%	4.7%	5.5%	6.5%	6.0%
Masters	6.0%	6.4%	6.1%	6.4%	8.7%	10.5%	9.9%	6.7%	7.6%	8.3%
Bachelor	10.7%	11.3%	11.0%	12.0%	12.7%	12.7%	13.3%	11.5%	11.9%	12.3%
Associate	13.8%	11.8%	16.0%	18.8%	18.4%	21.2%	26.7%	15.8%	17.2%	20.2%
College division level:										
Doctoral	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.6%	5.0%	0.0%
Masters	0.0%	0.0%	7.7%	5.0%	3.7%	6.5%	9.1%	3.3%	4.6%	6.4%
Bachelor	8.5%	14.8%	7.9%	6.4%	11.0%	7.7%	11.7%	9.7%	9.6%	8.9%
Associate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Program level:										
Doctoral	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Masters	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bachelor	0.0%	0.0%	50.0%	25.0%	0.0%	0.0%	0.0%	15.0%	15.0%	15.0%
Associate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

note: includes all active program matching majors among 4 possible major codes; URM includes black non-hispanic, hispanic, american indian/alaskan native & hawaiian.

Table 15: Race/Ethnicity of Degreed Conferred Students by Fiscal Year

Degree level:	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Total	2	2	2	4	5	3	4	3	3	4
Total URM	0	0	1	1	0	0	0	0	0	0
Doctoral Total	0	0	0	0	0	0	0	0	0	0
white non-hispanic	0	0	0	0	0	0	0	0	0	0
black non-hispanic	0	0	0	0	0	0	0	0	0	0
hispanic	0	0	0	0	0	0	0	0	0	0
asian non-hispanic	0	0	0	0	0	0	0	0	0	0
american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
foreign	0	0	0	0	0	0	0	0	0	0
hawaiian	0	0	0	0	0	0	0	0	0	0
multiple race	0	0	0	0	0	0	0	0	0	0
unknown	0	0	0	0	0	0	0	0	0	0
Masters Total	0	0	0	0	0	0	0	0	0	0
white non-hispanic	0	0	0	0	0	0	0	0	0	0
black non-hispanic	0	0	0	0	0	0	0	0	0	0
hispanic	0	0	0	0	0	0	0	0	0	0
asian non-hispanic	0	0	0	0	0	0	0	0	0	0
american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
foreign	0	0	0	0	0	0	0	0	0	0
hawaiian	0	0	0	0	0	0	0	0	0	0
multiple race	0	0	0	0	0	0	0	0	0	0
unknown	0	0	0	0	0	0	0	0	0	0

(Table continued on next page)

Program Review Self Study FY2014 College: LAS Nat. Sci. & Math Department: Math,Stats & Phys Program: Physics

(Table 15 continued)

Degree level:		Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Bachelor	Total	2	2	2	4	5	3	4	3	3	4
	white non-hispanic	1	2	0	3	5	3	3	2	3	3
	black non-hispanic	0	0	1	0	0	0	0	0	0	0
	hispanic	0	0	0	1	0	0	0	0	0	0
	asian non-hispanic	0	0	0	0	0	0	0	0	0	0
	american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
	foreign	1	0	1	0	0	0	0	0	0	0
	hawaiian	0	0	0	0	0	0	0	0	0	0
	multiple race	0	0	0	0	0	0	1	0	0	0
	unknown	0	0	0	0	0	0	0	0	0	0
Associate	Total	0	0	0	0	0	0	0	0	0	0
	white non-hispanic	0	0	0	0	0	0	0	0	0	0
	black non-hispanic	0	0	0	0	0	0	0	0	0	0
	hispanic	0	0	0	0	0	0	0	0	0	0
	asian non-hispanic	0	0	0	0	0	0	0	0	0	0
	american indian/alaskan native	0	0	0	0	0	0	0	0	0	0
	foreign	0	0	0	0	0	0	0	0	0	0
	hawaiian	0	0	0	0	0	0	0	0	0	0
	multiple race	0	0	0	0	0	0	0	0	0	0
	unknown	0	0	0	0	0	0	0	0	0	0

note: includes all active program matching majors among 4 possible major codes.

Tables 16 provides data for Section 5 of the Program Review Self Study Template.

Table 16: Department Student Credit Hour (SCH) by Student Department Affiliation on Fall Census Day

Major & student level:	Year of Fall Census Day 2007	2008	2009	2010	2011	2012	2013	Rolling 5 year average 2007-2011	2008-2012	2009-2013
Total	12,567	13,690	14,843	14,748	14,830	15,135	15,793	14,136	14,649	15,070
Program UG majors	112	118	195	203	284	387	319	182	237	278
Program GR majors	0	0	0	0	0	0	0	0	0	0
Non-program majors	12,455	13,572	14,648	14,545	14,546	14,748	15,474	13,953	14,412	14,792
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Program UG major	0.9%	0.9%	1.3%	1.4%	1.9%	2.6%	2.0%	1.3%	1.6%	1.8%
Program GR major	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Non-program majors	99.1%	99.1%	98.7%	98.6%	98.1%	97.4%	98.0%	98.7%	98.4%	98.2%

note: program majors includes all active program matching majors among 4 possible major codes.