Department of Mathematical Sciences

To: Christa Slaton, Dean, Arts and Sciences
From: Joseph Lakey, Academic Department Head
Date: 13 November 2015
Subject: Department Summary and Analysis for 2014–2015 and Goals for 2015–2016

Mission Statement

The Department of Mathematical Sciences provides core education in mathematics and statistics that prepares graduate and undergraduate students to be knowledgeable and responsible citizens of the world. It does this by conducting research, scholarship, and teaching, including teaching service courses for other programs, to fulfill the land grant mission of the university.

Personnel Changes

The Department of Mathematical Sciences had two resignations, that of *Marcus Cohen*, who retired with thirty years of service, distinguished partly by his role in the Projects based Calculus program in the early 1990s, and of *Debra Zarret*, one of our College Faculty members, who served NMSU for over 17 years, with particular distinction for her Calculus instruction, after earning her Math PhD at NMSU in 1996. The department was fortunate to be able to hire *Jameson Cahill* as a tenure-track Assistant Professor and *Xuemei Chen* as a College Assistant Professor, beginning in Fall 2015. *Andres Contreras* also joined the department as a tenure-track Assistant Professor in January and *Paul Tian* officially started in October 2014. The department also had two new College Assistant Professors, *Karen Villaverde* and *Ron Ausbrooks*, join the department in Fall 2014. The department had a full year visitor, *Rama Mishra*, who was on sabbatical from IISER-Pune during the 2014-2015 academic year. Rama's visit was funded by the Dean's office and Rama contributed substantially to the academic life of the department, partly by teaching MATH 643 in Fall 2014 and MATH 453/503 in Spring 2015. The number of new and continuing faculty in 2014-2015, including Cohen and Zarret, but not Contreras, was 21 tenure-track (+1) and 8.25 FTE College-track (+.25) relative to 2013-2014.

Accomplishments

Externally Funded Activities. The Department of Mathematical Sciences ranked 113th in the U.S. in total R&D expenditures in FY2013[1], good for a department of its size, but down from its inflated ranking in the upper twenties a few years ago when LIFT was funded at $1M/year. The ranking should improve based on several recent NSF grants listed below. Math faculty members continue to seek funding primarily through highly competitive sources. Faculty involvement in external funding will be reported as follows. First new, ongoing and closeout ARGIS funding will be reported. Non-Argis funded programs

[1] Source: http://ncsesdata.nsf.gov/herd/2013/html/HERD2013_DST_43.html

will be identified next with information on funding agency and home institution. Proposals declined or under review in 2014-2015 will be reported to give a comprehensive view of faculty involvement in external funding and its pursuit.

New funded programs listed in ARGIS programs are as follows:

Lodder, Gerald (Principal), "Collaborative Research: RUI: Transforming Instruction in Undergraduate Mathematics via Primary Historical Sources," Sponsored by National Science Foundation, $115,011.00. (August 1, 2015 - July 31, 2020).

Bulger-Tamez, Wanda M. (Principal), **Morandi, Patrick J.** (Co-Principal), "FY15 MC2 PED," Sponsored by NM Public Education Department, Local, $1,198,936.00. (October 6, 2014 - September 30, 2016).

Tian, Jianjun Paul (Principal), "Collaborative Research: New Formulation & Algorithms for Fluid-Structure Interaction with Application to Tumor Growth," Sponsored by National Science Foundation, $111,511.00. (May 21, 2014 - August 31, 2016, at NMSU beginning October 2014).

Harding, John (Principal), "Events as Decompositions," Sponsored by Foundational Questions Institute, $44,330.00. (September 1, 2015 - September 1, 2017).

Trujillo, Karen M (Co-Principal), Chamberlin, Barbara Anne (Co-Principal), **Stanford, Theodore B.** (Co-Principal), Wiburg, Karin (Principal), "Math Snacks for Early Algebra - Using Games & Inquiry to Help Students Transition from Number to Variable," Sponsored by National Science Foundation, $1,426,532.00. (September 1, 2015 - August 31, 2019).

The following ARGIS projects have *ongoing* funding (closeout after 8/18/15):

James, Avis C (Co-Principal), James, Avis (Co-Principal), **Ballyk, Mary M.** (Co-Principal), Boecklen, William (Principal), "Collaborative Research: Integrating Mathematics into the Introductory Biology Curriculum: A First Step," Sponsored by National Science Foundation, $161,367.00. (June 1, 2012 - August 31, 2015).

Dai, Shibin (Principal), "Degenerate Diffusion in Complex Amphiphilic Structures," Sponsored by National Science Foundation, $114,210.00. (August 15, 2014 - July 31, 2017).

Fouli, Louiza (Principal), "Parameters, Blowup Algebras and Connections to Combinatorics," Sponsored by Simons Foundation, $35,000.00. (September 1, 2012 - August 31, 2017).

Longo, Nicholas P. Michalowski (Principal), "Collaborative Research: Branching Markov Chains and Stochastic Analysis Associated with Problems in Fluid Flow," Sponsored by National Science Foundation, $81,639.00. (July 1, 2014 - June 30, 2017).

Bulger-Tamez, Wanda Maria (Principal), Bulger-Tamez, Wanda M. (Principal), Wiburg, Karin (Co-Principal), **Morandi, Patrick J.** (Co-Principal), "2014 PED-MC2," Sponsored by NM Public Education Department, Local, $1,169,441.00. (February 6, 2014 - September 30, 2015).

Stanford, Theodore B (Co-Principal), Chamberlin, Barbara Anne (Co-Principal), Stanford, Theodore B. (Co-Principal), Wiburg, Karin (Principal), "Math Snacks: Addressing Gaps in Conceptual Mathematics Understanding with Innovative Media," Sponsored by National Science Foundation, $3,498,667.00. (September 1, 2009 - August 31, 2015).

Cao, Huiping (Co-Principal), Cao, Huiping (Co-Principal), **Villaverde, Karen** (Co-Principal), Pontelli, Enrico (Principal), "BPC-AE: Computing Alliance of Hispanic-Serving Institutions " Sponsored by University of Texas at El Paso, $263,897.00. (May 15, 2011 - August 31, 2016).

The following projects *closed* either during the review period or at the end of August 2014:

Giorgi, Tiziana (Principal), "Investigations of Liquid Crystalline Mesophase Transitions via Landau-de Gennes Phenomenological Models," Sponsored by National Science Foundation, $158,640.00. (August 15, 2011 - July 31, 2015).

Bulger-Tamez, W. M. (Co-Principal), Bulger-Tamez, W. M. (Co-Principal), **Morandi, P. J.** (Principal), Sponsored Research, "Mathematically Connected Communities - Leadership Institute for Teachers", Sponsoring Organization: National Science Foundation, Research Credit: $2,491,782.50, PI Total Award: $4,983,565.00, (July 1, 2009 - December 31, 2014).

Bulger-Tamez, W. M. (Principal), Kurtz, D. S. (Other), Bulger-Tamez, W. M. (Principal), **Morandi, P. J.** (Co-Principal), Sponsored Research, "MC2-MSP Phase IV", Sponsoring Organization: NM Public Education Department, Research Credit: $125,629.70, PI Total Award: $1,256,297.00, (March 14, 2013 - September 30, 2014)

The faculty of Mathematical Sciences were involved in other *non-ARGIS funding* either as co-PIs on grants administered through other universities or as senior personnel (non-co-PI) on ARGIS grants. Here is a partial list of programs that were reported by faculty on their annual reports.

M. Ballyk (Participant), "2014 PED-MC2," NM Public Education Department, $1,169,441.00, Description: Bulger-Tamez, W. M. (Principal), Wiburg, K. (Co-Principal), Morandi, P. J. (Co-Principal), Sponsoring Organization: NM Public Education Department

M. Ballyk (Participant), "MC2-MSP Phase IV," NM Public Education Department, $1,256,297.00, Description: Kurtz, D. S. (Other), Bulger-Tamez, W. M. (Principal), Morandi, P. J. (Co-Principal), Sponsoring Organization: NM Public Education Department,

Bezhanishvili, G. (Co-PI), Sponsored Research "Topological semantics of modal logic", Sponsoring Organization: Shota Rustaveli National Science Foundation (Georgia), Total Award: $120,000.00, (May 2012 – April 2015).

L. Fouli (Senior Personnel) "iCredits: interdisciplinary Center of Research Excellence in Design of Intelligent Technologies for Smartgrids," National Science Foundation, $4,999,721.00,

L. Fouli (co-PI), "Southwest Local Algebra Meeting 2015," National Science Foundation, $15,799.00, Participant support for Southwest Local Algebra Meeting (SLAM) held at Oklahoma State University in February 2015.

L. Fouli (co-PI) "Southwest Local Algebra Meeting 2014," National Security Agency, $14,000.00, Participant support for Southwest Local Algebra Meeting (SLAM) held at Texas A&M in March 2014.

J. Harding (co-PI) "NSF 0931980 BLAST conference award," NSF, $33,000.00, Ongoing award to fund a series of BLAST conferences. PI Keith Kearnes, UC-Boulder.

N. Michalowski (co-PI) "New Mexico Analysis Seminar 2014-2016," National Science Foundation, $49,388.00, Funded through UNM, Participant support for annual conference that alternates between UNM and NMSU. PI C. Pereyra, UNM.

G. Bezhanishvili, J. Harding, P. Morandi and B. Olberding (Senior Personnel) "SYSMICS: Syntax meet semantics: methods, interactions, and connections in substructural logics," Horizon 2020 (European Union). NMSU group is involved in a large EU grant involving over 50 researchers in 23 universities in 13 countries worldwide. PI Luca Spada, University of Salerno. Total Award: € 504,000.00, (March 2016 – March 2019).

J.-P. Tian (co-PI) "Research of New Emerging Infectious Disease Models with Media Coverage and Medical Constraints," National Nature Science Foundation of China, ¥640,000.00, PI: Jingan Cui, Beijing University of Architecture and Civil Engineering. 2014 to 2017.

The following ARGIS projects were reported in faculty annual reports as submitted during the review period but were not funded or are currently under review:

Fouli, L. (Principal), Sponsored Research, "Parameters, Blowup Algebras and Symbolic Powers", Sponsoring Organization: National Security Agency

Lakey, J. D. (Principal), Sponsored Research, "Prolate Shift Frames and Hilbert Spectral Analysis", Sponsoring Organization: National Science Foundation. A proposal was also submitted for a Simons Collaboration Grant that was also declined.

Olberding, B. (Principal), Sponsored Research, "Birational Algebra and the Zariski-Riemann Space of Valuation Rings", Sponsoring Organization: National Science Foundation,

Smits, R. G. (Principal), Sponsored Research, "Simons Fellowship for Sabbatical in Rome", Sponsoring Organization: Simons Foundation,

Stanford, T. B. (Principal), Sponsored Research, "Mathematical Communication Among STEM Professionals", Sponsoring Organization: National Science Foundation,

Palacios, R. (Co-Principal), **Wang, T.** (Co-Principal), Keeley, D. W. (Principal), Sponsored Research, "Obesity: How Morphometrics Behavior and Biomechanics Relate", Sponsoring Organization: Mountain West Research Consortium,

Dolgov, I. (Co-Principal), **Wang, T.** (Co-Principal), Ma, O. (Principal), Sponsored Research, "A Bio-Inspired Approach for a Robot to Reach a Fast Moving/Rotating Object for Capture", Sponsoring Organization: National Science Foundation,

J. P. Tian "Ebola virus: mechanisms of transmission, epizootic and epidemic," National Science Foundation, $200,000.00, This was a RAPID proposal.

Altogether, eleven of 20 ongoing tenure-rack faculty members were involved in funded activities in which NMSU was funded directly from external sources. Two others were involved in activities funded at other institutions and three additional faculty members sought external funding during 2014-2015.

Research and Creative Activity. Research output measured by publications in 2014-2015 was slightly above that of 2013-2014. Publications were listed a net of 34 times in APRs, including two conference proceedings, two book chapters, one edited collection, and one textbook. Two articles had three collaborators in the department and two more had two collaborators in the department, so the number of unique articles or books is 28. In comparison, the department produced 29 paper authorships (counting duplicate authors) in 2013-2014. An additional 30 articles were accepted in 2014-2015, compared to 21 in 2013-2014. Thirteen of 21 tenure-track faculty listed at least one work published in 2014-2015. As in the past, most of the publications were produced by a small number, with five faculty reporting more than two works published (though three of these collaborated with one another). AMS data on graduate programs[2] currently lists only 14 tenure-track faculty as having published in the last three years. In comparison, U. Arizona lists 30 faculty with recent publications (they have 59 tenured) and UNM list 18 of 31. So currently our *ratio* is relatively good, but very few PhD granting Math departments in the U.S. have fewer than 15 faculty members visibly active in research.

Awards, Recognitions and Leading Scholarly Service. Mary Ballyk was recognized in Spring 2015 as a recipient of an *Arts and Sciences Outstanding Faculty Achievement Award in Teaching*. Ross Staffeldt was recognized as a recipient of a *Globalization Award* through the Vice President for Research Office. Bruce Olberding was the recipient of an *Arts and Sciences Course Release Award* and Andres Contreras was the recipient of an *Arts and Sciences Grants for Grants Award*. Some faculty members were recognized in other ways as leaders in their academic fields through invitations to give important conference presentations. Guram Bezhanishvili delivered an invited lecture series on Frames, Topologies, and Duality Theory at the Summer School for TACL 2015 in Salerno Italy. Bruce Olberding delivered an invited plenary address at the conference on Arithmetic and ideal theory of commutative rings and semigroups, University of Graz—Karl Franzen, Austria in September and Robert Smits was one of a select group of 17 speakers at the Conference in Stochastic Analysis and Related Topics at Purdue University in May.

Other evidence of the reputations of our faculty can be found in their professional obligations. Several faculty serve on Editorial Boards of scholarly publications, including Pat Baggett, *European Journal of Mathematics and Science Education*, Guram Bezhanishvili, *Journal of Language, Logic, and Computation*, *Tbilisi Mathematical Journal* and *Studia Logica*, John Harding, *Order*, Pat Morandi, *Journal of Algebra and Computational Applications*, Bruce Olberding, *Journal of Commutative Algebra* and *Communications in Algebra*, Ross Staffeldt *Journal of Homotopy and Related Structures*, and Jianjun Paul Tian, *Journal of*

[2] source: http://www.ams.org/cgi-bin/agf/agf.cgi?listing_id=1728

Algebraic Statistics. Bezhanishvili also serves on scientific committees for four different conference series (TACL, TOLO, TbiLLC and BLAST).

A special distinction goes to John Harding who currently serves as *President of the International Quantum Structures Association* that has members in 26 countries in five continents.

Because of its sensitive nature, work done reviewing grant proposals and tenure and promotion cases sometimes goes unreported. Since this summary will be posted on the department web page, details of activities done during the 2014-2015 period will be left vague. Shibin Dai reported serving on an NSF grant review panel. Bruce Olberding served as an external referee for three tenure and promotion cases, one at a four year comprehensive and two at universities nationally ranked above NMSU. Lakey served as an external referee for a Promotion to Professor case at a university nationally ranked above NMSU. While the total amount of national service of this nature reported in 2014-2015 was slightly below the levels in recent years, possibly due to retirements of senior faculty members, professional service reported in the form of refereeing and reviewing scholarly articles appeared to be slightly increased from prior years. About three-quarters of the tenure-track faculty reported activity of this nature.

The Department of Mathematical Sciences hosted four conferences and workshops in 2014-2015. The largest was the *BLAST* conference (full title too long to include) in January organized by Bezhanishvili, Harding and Morandi with NSF support for participant costs (Harding is co-PI; the PI is at University of Colorado, which administers the funds). This conference, held in Las Cruces, had about 80 participants from at least five countries outside the US. Local support from Arts and Sciences and the VPR and Provosts offices made a difference. Three weekend conferences were held in Spring. One was the *Knot Theory Symposium* which had local support for three external speakers, organized by Staffeldt and Lodder. Second was the *16th Joint NMSU/UTEP Workshop on Mathematics, Computer Science, and Computational Sciences* organized by Villaverde and Wang. The workshop provides a unique opportunity for faculty and advanced graduate students to present their work to a general scientific audience. The other was the *New Mexico Analysis Seminar* organized by Michalowski, with NSF support from a grant through UNM on which Michalowski is co-PI. Monica Visan from UCLA delivered an outstanding series of three lectures on Dispersive PDEs and guests came as far as Japan for the weekend conference, which had about 40 participants. Other faculty members were involved in organizing external conferences and workshops, including Bezhanishvili (TACL 15 in Italy) and Giorgi who organized a *Minisymposium on The Ginzburg-Landau Model and Related Topics* at the 8th International Congress on Industrial and Applied Mathematics - ICIAM 2015 in Beijing in August. The minisymposium had 12 speakers from universities in four different continents.

Several faculty members presented their work at international venues in 2014-2015, three already mentioned (Bezhanishvili Italy, Olberding in Austria and Giorgi in China). Other international presentations at conferences and universities were given by Dai (Tsinghua University, Beijing) Giorgi (Charlottetown, Prince Edwards Island; Hamilton, Nova Scotia; Lyon, France; and Rome); Harding (Amsterdam); Lakey (Halifax NS, Newcastle AUS, and Beijing, Xian and Yangling District, China); Tian (Beijing (2), Weihai, and Xian, China) and Wang (Xian, Beijing (2), Hohhot, and Yangling District, China; and Bangkok and Chiangmai (2)). Additional external research presentations at conferences and universities in the U.S were given by these faculty as well as others including Baggett, Fouli, and Smits. The overall number of external presentations was comparable to 2013-2014, but more faculty members gave high profile presentations this year. In addition to faculty presentations, several PhD students presented their work at national conferences as well.

University Service and Outreach. Just as a high percentage of research papers produced by the department are the works of a relatively small group of researchers, a high proportion of departmental service is also managed by relatively few faculty members, whose tireless efforts in keeping our undergraduate and graduate programs running and making sure our curricula form the basis for solid programs make possible the prolific output of some of the other faculty members. Several faculty members also served Arts and Sciences on its standing committees, including Pat Baggett (Graduate Affairs Committee, appointed), Tiziana Giorgi (Curriculum and Educational Policies Committee), Bruce Olberding (Planning and Budget Committee), Susana Salamanca-Riba (Research Affairs Committee, Chair through May; Pat Morandi standing in for 2015-2016) and Linda Zimmerman (A&S College track promotion committee). Several faculty members also serve as Dean's representatives on promotion and tenure committees, including Baggett (Communication Studies), Morandi (Psychology), Smits (Computer Science) and Staffeldt (Philosophy). Tony Wang also served the college as part of a delegation to Donghua University in Shanghai in December. Other faculty participated on internal university committees and by representing the university in a professional capacity. Some of the roles reported included Ballyk (Center for Peer Learning Assistants Board), Fulte (New Mexico Articulation Task Force), Lakey (Graduate Dean Search), Lodder (General Education Course Certification), Morandi (Faculty Senate, including Chair of its Faculty Affairs committee), Mostafa (Committee for Assessment of Student Learning–General Education), Staffeldt (representative of IISER-Pune delegation), Stanford (Mathematics Teacher Education Partnership) and White-Hosford (Preparing Future Faculty Advisor). Abby Train represented the department in too many ways to list here.
Several faculty members reported outreach in various forms. Pat Baggett hosted lessons for Sierra Middle School field trips in September and May, Alyne Fulte gave a presentation at the AAUW Girls Can! Conference on March 14. Joe Lakey presented the *History of Pi* at MoNaS, also on Pi Day and gave Career Day presentations at Desert Trails Elementary in Chaparral in April. Jerry Lodder offered tutoring at Arrowhead center in September. Amal Mostafa was a judge for local, regional and national science fairs culminating in the International Science and Engineering Fair in Pittsburgh (May 10–15, 2015). Susana Salamanca-Riba served as the Las Cruces representative of the MIT Education Council. Robert Smits served as the Actuarial Science Advisor, maintaining contact with members of the local actuarial and insurance industries, particularly in El Paso. Laura White-Hosford organized a STEM Night activity at Columbia Elementary in April, involving several students in her Fundamentals of Elementary Math courses.

Student Credit Hour production. Enrollments in MATH/STAT courses declined for the second consecutive year. In lower division, Fall 2015 census enrollments were 10,965, down from 11,509 in Fall 2014 and from 11,718 in Fall 2013. Fall 2015 graduate enrollments were at 298, down from 391 in Fall 2014, down in turn from 442 in Fall 2013, a net decrease by about a third. While these are smaller numbers than our undergraduate ones, they indicate more drastic consequences for the department since half or more of the MATH degrees are MS and PhDs. The numbers forecast a decline in graduate math degrees, a consequence in turn of failure to recruit well-prepared graduate students in recent years, despite countless hours spent by the graduate recruiting committee reading applications and communicating with potential candidates. A second consequence is that there are fewer advanced graduate courses available for PhD students to take, meaning that either students are not getting as much advanced content training or the burden of training is fall entirely on the supervisor.

The parallel decrease in lower division is accompanied by a downward shift in enrollments. Here are the numbers of sections in Fall 2015 (with differentials relative to Fall 2014 and 2013 respectively) of our largest lower division courses: MATH 120: 14 (+1, +2); MATH 121G: 16 (0,-2); MATH 190G: 7 (-1,-2); MATH 191G: 6 (-3,-3); MATH 192G: 5 (-1,0). STAT 251G: 8 (0,+1). While the short-term consequence is a

decrease in the amount of temporary instruction done in the Fall, an inevitable long term consequence, if the trend continues, will be a corresponding downward shift in the level of MATH/STAT courses taught by our regular faculty members, which could also impact research productivity.
On the positive side, upper division enrollments in Fall 2015 were 1,527, up almost 10% from 1,393 in Fall 2014, which in turn was up from 1,263 in Fall 2013. Much of this increase is accounted for by full sections of MATH 392 and MATH 480 and other applied math courses.
Several college faculty continued to teach more than 1000 student credit hours in-load in 2014-2015, including Linda Zimmerman (1683), Ron Ausbrooks (1140), Chris Stuart (1083, nearly half upper division), and Alyne Fulte (1056). Several others taught over 800 SCHs.

Majors and Degrees. The department produced seven PhDs between Fall 2014 and Summer 2015, including Meredith Anderson (Staffeldt), Deepak Basyal (Baggett), Lokendra Paudel (Olberding), Qingsong Shan and Zheng Wei (Wang), Julio Urenda Castaneda (Finston) and Feras Yousef (Giorgi). The department also graduated nine Master's students and eleven Bachelor's students, including 5 in the Applied Math Emphasis, 3 in General Math and two in Actuarial Math (one unknown). Six of these were Crimson Scholars. By comparison, in 2013-2014 the department graduated 3 PhDs, 6 MS and 13 BS students and in 2012, 4 PhD, 6 MS and 10 BS. Our graduate degrees represent a less diverse group than in recent years and included 10 Asian students, 1 African American, 2 Hispanic and 3 White. Only two were female. Among 11 BS degrees three were Hispanic. Eight of the 11 BS students were female.

Currently the department has 32 graduate students, of which 18 are doctoral students and the others are Master's students. Ten of the graduate students are female. Thirteen are Asian, four are African or African American, five are Hispanic and the others are whie (American (2) or Middle Eastern). There are currently 64 undergraduate majors of whom 20 have declared double majors, the majority roughly evenly split between Engineering and Arts and Sciences.

In 2014 Michalowski coached a team of three NMSU students in the 2014 William Lowell Putnam Exam Competition held on December 6, the Saturday before finals week. There were teams from 431 institutions. Every NMSU participant scored points on the exam, which is significant since inmost years the median score on the exam is zero.

Progress on goals.

Stated **teaching goals** for 2014-2015 were: (1) Identify successful and unsuccessful modifications in MATH 120 and MATH 190G, and document student success in the calculus sequence relative to student preparation as measured by readiness tests. Work with the administration and other campuses to identify desired learning outcomes that can be measured in a meaningful way.

Mary Ballyk coordinated MATH 120G in both semesters and instituted several pedagogical changes in response to the perception that several students were completing MATH 120 successfully only to go on and fail MATH 121G. Changes included disallowing the use of calculators and emphasizing to each student that he or she is solely responsible for acquiring skills and retaining content knowledge. Abby Train modified MATH 190G to incorporate weekly labs. In both 120 and 190G, Peer Learning Assistants are now being used to facilitate learning. The department also implemented readiness testing in Calculus I and II. Abby Train continues to monitor success rates in each section of our lower division courses. Pass rates continue to be very low in our multi-section Gen Ed courses, with mean pass rates in the low 50s in 120, 121G, 190G, 191G and 192G. There is remarkable variation in these rates among

sections, even in cases in which the sections have the same instructor. Continued monitoring will help us to determine whether any pedagogical changes have made a difference.

Though it was not a goal, the department, led by Mary Ballyk and Abby Train, developed a new course evaluation instrument after IRPOA communicated that it no longer had the capacity to process thousands of MATH evaluations each semester. The workload was transferred to department staff.

The primary stated **research goal** for 2014-2015 was to involve each graduate faculty member in peer-reviewed work either submitted or accepted or performed in a suitable context in 2014–2015, continuing to emphasize the Boyer framework in the context of performance suitable for a research-intensive department of Mathematical Sciences. As mentioned, 13 of 21 tenure-track faculty listed at least one work published in 2014-2015. Of the remaining eight, only three did not demonstrably have articles accepted or submitted for publication in 2014-2015. Each of these three was actively involved in scholarship of teaching and engagement in different ways. Goals for 2015-2016 will reflect, in addition, the desire for involvement in funding activities insofar as they align departmental activities with key performance indicators on which departments are likely to be evaluated as we approach 2020.

The primary stated **service goals** for 2014-2015 were (1) involve at least half of the graduate faculty in a college or university committee or policy body, or in scholarship in the service of broader educational interests and (2) Involve at least two-thirds of the graduate faculty on professional committees, panels or conference organizing committees, or in reviewing scholarly work. Involve half or more of the departmental College Faculty in committee or policy work that extends beyond the department.

Four of seven FTE college faculty reported involvement in committee or policy work extending beyond the department. Having met this goal, the department is reluctant to aspire to increase the number of college faculty involved in such activities unless there is a clear expectation that the activity will enhance student success. Quality teaching not only involves preparation and reflection but also a huge amount of time spent giving students necessary feedback on their work. This should continue to be the priority for college faculty members. Of twenty graduate faculty in the department, twelve reported service to the college or university or scholarship in the service of broader educational interests. That goal was met. Junior faculty were not encouraged to prioritize such roles over their research. For 2015-2016 it makes sense to revise the goal such that all tenured faculty are involved in such activities, or contributing to departmental service in a fundamental way that furthers the general educational mission of the whole college. Regarding the second stated goal for graduate faculty, in light of editorial boards, scientific committees, and conference organization reported, and further reviewing of professional work reported, it seems an attainable goal moving forward to have every tenure-track faculty member involved in such activities at some level.

Program goals for 2014-2015 were to encourage all second-year Master's degree students to complete their work (or move on) in 2015, have one-fourth of our current PhD students successfully complete their work (or move on) in 2015, and graduate a number of Bachelor's students consistent with numbers in the past two years.

These goals were met. As mentioned, the department graduated 7 PhDs in 2014-2015—the largest number it has produced in a recent year. The department will continue to aspire to produce four or five PhDs on average in the near future. It will be a challenge to continue to produce on the order of a dozen BS degrees per year, particularly as a high proportion of Math majors are double majors. The decrease to 120 SCHs for undergraduate degrees will make this option less attractive.

Mathematical Sciences Goals for 2015–2016:

The department feels that an academic program review in the near future would provide very helpful feedback for deciding on steps to take to maintain current strengths and make improvements in our programs where possible. The following goals listed should really be viewed as maintenance until the department has had the opportunity to develop a long-term vision.

Teaching Activities: As per the Provost's request, design and implement a course in preparation for MATH 120 (MPL2) for students who did not have initial placement into MATH 120 (MPL2). Pilot a Junior Math Placement (JuMP) program in Gadsden Schools. Continue to track completion rates in our General Education courses MATH 120, 121G, MATH 190G–291G and STAT251G.

Teaching Goals: Accommodate students with initial placement below MPL2 and have at least half of that population who registered for Math and attended regularly in the fall ready for MATH 120 or another MPL2 course by the end of the fall semester. Maintain or improve completion rates in Gen-Ed MATH.

Research Activities: Continue overall publication and other nationally and internationally recognized scholarship at levels consistent with recent years.

Research Goals: Involve each graduate faculty member in peer-reviewed work either submitted or accepted or performed in a suitable Boyer context in 2015–2016. Continue to have about three-quarters of the tenure-track faculty publishing original mathematical research visible to potential PhD students. Maintain current levels of funded activity with the aspiration of having all tenure-track faculty involved in externally funded work or in seeking funding.

Service Activities: Continue to serve the college, university, and profession in ways that reflect the central role of mathematics in promoting quantitative reasoning across curriculum, in promoting quantitative analysis in strategic planning, and in maintaining a strong national reputation.

Service Goals: Involve all tenured faculty in college or university committees, policy bodies or task forces, or in scholarship or public service in support of NMSU's educational mission, or contributing to departmental service in a critical way that furthers the general educational mission of the university.

Program Activities: Recruit and closely advise new Master's students, encourage timely completion of degrees and maintain a balance in graduate programs with slightly over 50% of graduate students in the PhD program. Continue to publicize our major emphases and to reconsider whether any adjustments to the requirements of the different emphases are needed.

Program Goals: Continue to graduate four or five PhDs and about 10 or 12 MS and BS students per year.