

Department of Mathematical Sciences



To: Enrico Pontelli, Dean, Arts and Sciences
From: Joseph Lakey, Academic Department Head
Date: 16 November 2016
Subject: Department Summary and Analysis for 2015–2016 and Goals for 2016–2017

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 *Ross Staffeldt*, who retired with thirty years of service, distinguished partly by his service as Department Head from 2003–2006, and of *Xuemei Chen*, one of our College Faculty members, who took a tenure-track position at the University of San Francisco. The number of new and continuing faculty in 2015–2016, including Cahill, Chen, Contreras and Staffeldt, was 22 tenure-track (+2) and 8.5 FTE college-track (+.25) relative to 2014–2015. For 2016–2017 the faculty will number 21 tenure-track and 7.5 college-track.

Sabbaticals Department activities for 2015–2016 should be viewed in the context of an unusually large number of tenure-track faculty members being on sabbatical: Louiza Fouli, Tiziana Giorgi, Susana Salamanca-Riba and Robert Smits had full year sabbaticals in 2015–2016; Tony Wang took a semester sabbatical in Fall 2015 and Bruce Olberding had a semester sabbatical in Spring 2016. The department hired two of its newly minted PhDs, Feras Yousef and Lokendra Paudel, as Visiting Assistant Professors, to cover courses vacated by faculty on leave. Feras now has a position at the University of Jordan and Lokendra now has a position at the University of Akron.

Accomplishments

Externally Funded Activities. The Department of Mathematical Sciences ranked 118th in the U.S. in total R&D expenditures in FY2014¹, good for a department of its size, but down five slots from its 2013 ranking and a long way down from its inflated ranking in the upper twenties a few years ago when LIFT was funded at \$1M/year. Total expenditures for 2014 were slightly up to \$1.08M from \$1.066M in 2013. Numbers for 2015 should be about the same as for 2014. Math faculty members continue to seek funding primarily through highly competitive sources.

¹ Source: https://ncesdata.nsf.gov/herd/2014/html/HERD2014_DST_43.html

Faculty involvement in external funding will be reported as follows. First new, ongoing and closeout ARGIS funding will be reported. Non-Argis funded programs will be identified next with information on funding agency and home institution. Proposals declined or under review in 2015–2016 will be reported to give a comprehensive view of faculty involvement in external funding and its pursuit.

New funded programs listed in ARGIS are as follows:

- Harding, John** (Principal), "Events as Decompositions," Sponsored by Foundational Questions Institute, \$44,330 (September 1, 2015 - July 31, 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 (September 1, 2015 - August 31, 2019).
- Kanim, Katherine W. (Co-Principal), Matthews, Lisa R. (Co-Principal), Bulger-Tamez, Wanda M. (Principal), **Morandi, Patrick J.** (Co-Principal), "FY16 MC2 PED," Sponsored by NM Public Education Department, \$1,300,185 (October 19, 2015 - September 30, 2017).

The following ARGIS projects have *ongoing* funding (closeout after 8/15/16):

- Dai, Shubin** (Principal), "Degenerate Diffusion in Complex Amphiphilic Structures," Sponsored by National Science Foundation, \$186,486 (August 15, 2014 - July 31, 2017).
- Fouli, Louiza** (Principal), "Parameters, Blowup Algebras and Connections to Combinatorics," Sponsored by Simons Foundation, \$35,000 (Sept. 1, 2012 - August 31, 2017).
- Ashley, Amanda (Co-Principal), Sanchez, Janet I (Co-Principal), Loest, Helena B (Co-Principal), Smeal, Daniel (Other), Sanchez, Janeth I. (Co-Principal), Loest, Helena B. (Co-Principal), Ashley, Ryan (Co-Principal), Houston, Jessica P. (Co-Principal), Jim, Jesse Martin (Co-Principal), **Tian, Jianjun Paul** (Co-Principal), Palacios, Rebecca (Co-Principal), Ashley, Amanda K (Co-Principal), Unguez, Graciela A. (Co-Principal), Lombard, Kevin A. (Co-Principal), Shuster, Michele (Co-Principal), O'Connell, Mary Anne (Principal), "Partnership for the Advancement of Cancer Research: NMSU/FHCRC," Sponsored by US Department of Health & Human Services/National Cancer Institute/NIH(DHHS), \$4,262,496 (September 25, 2013 - August 31, 2018).
- Lodder, Gerald** (Principal), "Collaborative Research: RUI: Transforming Instruction in Undergraduate Mathematics via Primary Historical Sources," Sponsored by National Science Foundation, \$115,011 (August 1, 2015 - July 31, 2020).
- 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 (July 1, 2014 - June 30, 2017).
- Ballyk, Mary** (Senior Personnel) Bulger-Tamez, Wanda M. (Principal), **Morandi, Patrick J.** (Co-Principal), "FY15 MC2 PED," Sponsored by NM Public Education Department \$1,198,936 (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 (May 21, 2014 - August 31, 2017).
- Cao, Huiping (Co-Principal), Cao, Huiping (Co-Principal), **Villaverde, Karen** (Co-Principal), Pontelli, Enrico (Principal), "BPC-AE: Computing Alliance of Hispanic-Serving Institutions (CAHSI) - Renewal," Sponsored by University of Texas at El Paso, \$263,897 (May 15, 2011 - May 31, 2017).

The following ARGIS projects *closed* either during the review period or at the end of August 2015:

- 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 (June 1, 2012 - August 31, 2015).

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, \$1,169,441 (February 6, 2014 - September 30, 2015).

Stanford, Theodore B (Co-Principal), Chamberlin, Barbara Anne (Co-Principal), Wiburg, Karin (Principal), "Math Snacks: Addressing Gaps in Conceptual Mathematics Understanding with Innovative Media," Sponsored by National Science Foundation, \$3,498,667 (September 1, 2009 - August 31, 2015).

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.

Bezhanishvili, G, Harding, J., Morandi, P., Olberding, B. (Senior Personnel); Luca Spada (PI, University of Salerno) "SYSMICS: Syntax meet semantics: methods, interactions, and connections in substructural logics," Horizon 2020 (European Union). This European Union grant involves more than 50 researchers in 23 universities worldwide (13 countries involved). Total Award: € 504,000.00.

"iCredits: interdisciplinary Center of Research Excellence in Design of Intelligent Technologies for Smartgrids," National Science Foundation, \$4,999,721.00, Enrico Pontelli (Principal), Satishkuma Ranade (Co-PI), Sukumar Brahma (Co-PI), Satyajayant Misra, (Co-PI), William Yeoh (Co-PI), **Louza Fouli** (Senior Personnel)

"Southwest Local Algebra Meeting 2016," National Security Agency (Texas State University), \$14,925.00, **Louza Fouli** (co-PI)

"Southwest Local Algebra Meeting 2015," National Science Foundation (Oklahoma State University), \$15,799.00, **Louza Fouli** (co-PI)

"New Mexico Analysis Seminar 2014-2016," National Science Foundation (University of New Mexico), \$49,388.00, **Nick Michalowski** (co-PI)

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*. For comparison, there were eight unfunded ARGIS proposals in 2014-2015 compared to thirteen here, indicating an increased level of effort in seeking external funding.

Wang, T. (Co-PI), **Ballyk, M.** (Co-PI), **Barany, E.** (Co-PI), **Tian, J.P.** (PI), "Frontiers in Mathematical Biology," National Science Foundation

Wang, T. (Co-PI), **Ballyk, M.** (Co-PI), **Barany, E.** (Co-PI), **Tian, J.P.** (Principal), "Frontiers in Applied Mathematics and Statistics," National Science Foundation, (Under Review)

Cahill, J. (Co-PI), **Lahey, J.** (PI), "CBMS Conference: Sparse Approximation and Signal Recovery Algorithms," National Science Foundation, (Listed as Under Review; now funded)

Chen, X. (PI), "Compressed Sensing with Frames and its Application to Imaging," National Science Foundation

Contreras, A. (PI), "Nearly Parallel Vortex Filaments in 3D Ginzburg-Landau Theory," National Science Foundation

Contreras, A. (PI), "Topological-defects in nonlinear elliptic problems," Simons Foundation, (Listed as Under Review. Now funded.)

Dai, S. (PI), "CAREER: Complex amphiphilic structures and the functionality of nanoparticles and biomaterials," National Science Foundation (Under Review)

Dai, S. (PI), "Mechanisms of action and antimicrobial efficacy of insect wing nanopillars," Idaho State University/NIH, (Under Review)

Fouli, L. (PI), "Studies on Symbolic Powers, Parameters and Blowup Algebras," National Security Agency

Fouli, L. (PI), "Studies on Symbolic Powers, Parameters and Blowup Algebras," National Science Foundation
Lakey, J. (PI), "Prolate Shift Frames and Hilbert Spectral Analysis," Simons Foundation
Kidwell, M. (S), Bulger-Tamez, W.M. (Co-PI), Kinzer, C.J. (Co-PI), **Morandi, P.** (PI), "Mathematically Connected Communities-Numeracy Expertise for Teaching," National Science Foundation
Olberding, B. (PI), "Birational Algebra and the Zariski-Riemann Space of Valuation Rings," National Security Agency

Altogether, all but five of the 21 ongoing tenure-track faculty members were involved in externally funded activities in 2015-2016. Most of those who were not involved in such activities were on sabbatical.

Research and Creative Activity (2015-2016). Research output measured by publications was significantly higher than output in the past few years. In 2014–2015, the number of unique books or papers published was 28. In 2015–2016 there were 44 unique (i.e., not counting multiple authorships in the department) journal articles, seven unique book chapters or conference proceedings, one book and one edited volume published. An additional 15 unique journal articles and 10 refereed book chapters and one full book were accepted for publication (comparable to the average of 2013–2014 and 2014–2015) and 14 unique articles were listed as submitted. All but four tenure-track faculty members had papers published in 2015–2016 and two additional faculty had work accepted for publication. Bezhanishvili and Wang were particularly prolific in 2015–2016. A couple of faculty members who did not report publications have been so heavily involved in service that, arguably, their service has created an opportunity for others to be more productive in research.

Other Scholarly Activities (2015–2016). Mathematical Sciences had an active colloquium schedule in 2015–2016, including three speakers from NMSU (Kitty Berver, retired, *Four Men of Mathematics*, 8/27, Xuemei Chen, *A 'frame'work for compressed sensing*, 9/17, Mingjun Wei, NMSU Mechanical Engineering, *Using Adjoint-Based Method for the Understanding and Optimization in Flexible Flapping Wings* 10/29).

The following colloquia were given by external visitors, including three international visitors:

Bo Li, UC San Diego, *Variational Implicit Solvation: Empowering Mathematics and Computation to Understand Biological Building Blocks* (Sept 3)

Martin Flashman, Humboldt State University, *Mapping Diagrams Take on Calculus* (Oct 1)

Benjamin Harris, Bard College at Simon's Rock, *Discrete Spectra in Abstract Harmonic Analysis* (Oct 15)

Wes Holliday, UC Berkeley, *Duality Theory for Possibility Frames and Boolean Algebras with Operators* (Nov 12)

K. C. Sivakumar, Indian Institute of Technology Madras, *Inverse Positivity of Interval Matrices* (Nov 19)

Andrzej Ehrenfeucht, University of Colorado, Boulder, *Elementary Arithmetic from a Computer Science Perspective* (Dec 3)

Carlos Garcia-Azpeitia, UNAM, Mexico, *Standing Waves in Near-Parallel Vortex Filaments* (Jan 21)

Carlos De la Mora, University of Texas at El Paso, *The Plancherel Theorem* (Feb 4)

Robert L. Jerrard, University of Toronto, *Vortex Filaments in the Euler Equation* (Feb 18)

Stephen D. Casey, American University, *Sampling in Euclidean and Non-Euclidean Domains: A Unified Approach* (Mar 10)

Anneliese H. Spaeth, Huntingdon College "Positive" Structured Complete Sets in L_p (Apr 24, cancelled due to weather)

Luca Spada, University of Salerno, *A General Algebraic Approach to Dualities* (April 31)

Awards, Recognitions and Leading Scholarly Service, 2015-2016. Abby Train was recognized with an *Arts and Sciences Outstanding Exempt Staff Award*. Bruce Olberding used an Arts and Sciences Course Release Award (made in Spring 2015) to work on new research problems in Fall 2015 and Andres Contreras took advantage of an *Arts and Sciences Grants for Grants Award* to write two grant proposals in the Fall, including a successful *Simons Foundation* Collaboration grant. Jerry Lodder's work on teaching mathematics using primary historical sources was the topic of an *Education Week* news release in September. Tony Wang was awarded a Dean's Citation for Teaching by the University of Sydney Business School (which has a *Financial Times* top 50 world ranking). Tony taught a course there while on sabbatical in Fall 2015. Several faculty were recognized for their work through invitations to speak at major conferences worldwide. Nick Michalowski coached a Putnam team that scored (cumulatively) in double digits.

Other evidence of the reputations of our faculty can be found in their professional obligations. Several faculty served on Editorial Boards of scholarly publications, including Pat Baggett, *European Journal of Mathematics and Science Education*, Guram Bezhnashvili, *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 Algebraic Statistics*. Bezhnashvili also served on scientific committees for four different conference series (TACL, TOLO, TbiLLC and BLAST).

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

Several members of the department were involved in organization of conferences and workshops. John Harding spend a few weeks as program committee co-Chair organizing the *Topology, Algebra, and Categories in Logic* (TACL) conference to be held in Prague in June 2017. Louiza Fouli co-organized a *Southwest Local Algebra Meeting* (SLAM) held at Texas State University, February 27-28. Tiziana Giorgi organized two separate minisymposia, one on Ginzburg-Landau theory and one on PDE Methods in Materials Science held at the SIAM Conference on Analysis of Partial Differential Equations in Scottsdale, December 7-10. Nick Michalowski co-organized the 15th New Mexico Analysis Seminar held at the University of New Mexico, February 19-21. Paul Tian co-organized a special session of the AMS Western Sectional meeting on Computational and Applied Biology in October, and Karen Villaverde and Tony Wang co-organized the 18th Joint NMSU/UTEP Workshop on Mathematics, Computer Science and Computational Sciences held at NMSU on April 2. Tony also chaired a session of the 9th International Conference of the Thailand Econometric Society in Chiangmai in February.

A good number of faculty members presented their work at international venues in 2015-2016. Pat Baggett and Jerry Lodder each gave invited presentations at the 13th International Congress of Mathematics Education (ICME-13) in Hamburg in July. Andres Contreras gave two invited presentations in Mexico, one at the Casa Matematica Oaxaca in June and one at Universidad Nacional Autónoma de México in November 2015. Shibin Dai gave two presentations in Beijing in June, one at the Chinese Academy of Sciences and one at Tsinghua University. Tiziana Giorgi gave two presentations in Rome in October, one at Sapienza - Università di Roma and one at Istituto per le Ricerche del Calcolo M.Picone

(IAC-CNR). Robert Smits also gave separate presentations at both institutions, in fact Robert presented different results in the Analysis and the Applied Analysis Seminars, Sapienza - Università di Roma. Tiziana also presented her work at the 8th International Congress on Industrial and Applied Mathematics in Beijing in August 2015. John Harding presented his work at the International Quantum Structures Association Conference in Leicester in June and at the Amsterdam Logic Seminar in September. Bruce Olberding gave invited seminars at the Università di Padova and at Università di Roma Tre in June. Earlier, Bruce was the external evaluator on a PhD Dissertation at Università di Roma Tre. Tony Wang takes the prize for the most international presentations during his sabbatical in Summer and Fall, 2015: He gave a total of 16 presentations on his scholarly work in China (Beijing, 2; Xian, 2; and Yangling and Hohhot), Thailand (Chiangmai, 3) and Australia (Sydney, 2) along with numerous pedagogical short courses at these and other locations. In all, 14 of 21 tenure-track faculty members reported presenting their work at professional conferences, workshops and seminars in 2015-2016.

University Service and Outreach. Department presence in university service was down a bit from recent years, again largely related to a large number of faculty members being on sabbatical, but also to allow pre-tenured faculty members to focus primarily on teaching and scholarship. Membership on Arts and Sciences committees included Pat Baggett (A&S Travel Grants, 2015), Guram Bezhanishvili (P&T, Criminal Justice), Pat Morandi (P&T, Psychology and A&S Research Affairs Committee), Bruce Olberding (A&S Planning and Budget Committee), Robert Smits (P&T, Computer Science, through August 2015), Ross Staffeldt (P&T, Philosophy), Tony Wang (Donghua University delegation), and Linda Zimmerman (A&S College-Track Promotion). The department was represented on University Committees by Mary Ballyk (Center for Peer Learning Assistance Board, Common Course Numbering Task Force and Passport Task Force), Alyne Fulte (NMATYC Board), Jerry Lodder (General Education Course Certification), Pat Morandi (Faculty Senate, Chair of FS Faculty Affairs Subcommittee, Provost's General Education Task Force), Amal Mostafa (CASL-GE through August 2015), Ted Stanford (Mathematics Teacher Education Partnership) and Laura White-Hosford (Preparing Future Faculty Mentor).

Faculty reported a variety of outreach activities. Mary Ballyk and Pat Morandi's involvement in the MC² program is largely outreach, involving interaction with around 400 Math teachers in schools statewide. Andres Contreras used wordpress to create a New Mexico Researcher's Network page, with the initial goal of stimulating interest in connection with Mathematical Analysis. Alyne Fulte reported promoting STEM fields in Middle School in her presentation at the AAUW Girls Can! Conference in Las Cruces in March. Joe Lakey talked about careers in Math to various grade levels at Loma Linda Elementary in Anthony during its Career Day in April and Abby Train hosted a visit of about 60 students from Deming High School to NMSU in November. Amal Mostafa served as a judge at the Southwestern New Mexico Regional Science and Engineering Fair in Las Cruces in March as the Head senior division judge and then also as a judge at the annual New Mexico State Science and Engineering Fair in Socorro in April. Laura White-Hosford also assisted with the Las Cruces science fair. At least a few faculty serve on recruiting boards for their almae matres (Salamanca-Riba and Lakey), interviewing prospective students, which also gives a chance to raise awareness of special opportunities that NMSU can offer. A few faculty consider their pedagogical work as outreach, including Jerry Lodder who wrote pedagogical modules that are being tested at other universities, and Ted Stanford who works in the MathSnacks program with the goal of making school level mathematics more compelling. Laura White-Hosford was involved in a number of outreach activities at Columbia Elementary and Hillrise Elementary and Pat Baggett hosted two days of math activities in the department for Sierra Middle Schoolers.

Student Credit Hour production. Enrollments in MATH/STAT courses declined for the third consecutive year. Fall census numbers for 2013–2016 were 13,423, 13,203, 12,692 and 11,974, respectively. The largest percent declines came in lower division, 11,718 in 2013 and 10,304 in 2016, a 12% decline relative to 2013, and graduate level, 442 in 2013 and 362 in 2016, ostensibly an 18% decline relative to 2013, but almost all of the graduate decline came from an artificial bump in SCH in 2013 funded externally by NSF through the LIFT program. The department has not been able to run as many advanced graduate courses and is trying to avoid a cycle of decreasing graduate enrollments. Upper division enrollments are actually up from 1263 to 1308 relative to 2013 but this increase will be difficult to sustain as Engineering will no longer require a key prerequisite (MATH 291G) for several upper division MATH classes. The decrease in lower division credits has been accompanied by a veritable race to the bottom: numbers of sections for Fall 2016 (compared to Fall 2015, 2014 and 2013) are as follows: MATH 120: 14 (--,+1,+2); MATH 121G: 15 (-1,-1,-3); MATH 190G: 7 (--,-1,-2); MATH 191G: 8 (+2,-1,-1); 192G: 5 (--,-1,-1); STAT 251G: 8 (--,-,+1). The silver lining, if there is one, is a modest recovery in MATH 191G, offering at least some hope for the future enrollments in more advanced courses.

As in recent years, the College Faculty members of Mathematical Sciences continue to process very heavy loads, including Ausbrooks (1284 SCH), Fulte (1127 in-load), Mostafa (1248 in-load), Stuart (1125), Villaverde (837), White-Hosford (774) and Zimmerman (1056). Some tenure-track faculty are also taking on larger loads by virtue of teaching large lecture courses (Ballyk, 849 SCH; Lakey 669 SCH) or teaching more than a standard load (Cahill, 657).

Majors and Degrees. The department only produced two PhDs during Fall 2015–Summer 2016 (Zahi Fawaz (Morandi), now an Assistant Professor at American University in Kuwait, and Weizhong Tian (Wang), now an Assistant Professor at Eastern New Mexico University. This is a sharp decline from the seven PhDs between Fall 2014 and Summer 2015, but the two year average of 4.5 is on par with the average over the past five years, and the variance is natural when considering that several faculty who went on sabbatical in 2015–2016 recently had students complete their PhDs. The department also graduated seven Master's students (Abdullah Abu Rqayiq, Samuel Aeyedipe, Philip Bauer, Ibrahim Jawarneh, Shitu Jimoh Fawaz, Ulrich Kemmo Tsafack and Cong Wang), which is just below the average over the past five years. Cong was the only female graduate degree recipient. The ethnicities of these nine include three white, two Asian, three African and one multiracial American. The department also graduated fourteen Bachelor's degrees in 2015–2016, above the average of about ten per year (Adrian Avila, Taylor Bosier, Ahmed De Alba Garza, Adam Ewert, Abril Gonzalez, Gregory Gutierrez, Buyan Li, Randy Lunde, Linda Mackmiller, Erik Ness, Luz Resendez, Griselda Rubio, Michael Stark and Alyssa Trujillo). This mix includes four females and ethnicities include 4 white, 1 Asian, and 9 Hispanic students. Twelve graduating students also took Minors in Mathematics in 2015–2016 (2 graduate and 10 undergraduate) including five CS majors, three Physics majors, one BIS and one English major, a Master's student in IE and a PhD student in Chem E.

In Fall 2016, the Math graduate program has 19 Master's (4 US Citizen, 8 female) and 18 PhD (4 US Citizen, 6 female) seeking students, consistent with the goal of having an even balance of students in the two programs. There is strong ethnic diversity (5 white, 11 Asian, 6 Hispanic, 5 Black or African American, 2 of two or more races, and 8 of unknown race or ethnicity). Currently there are 61 students declared as undergraduate Math majors, a number consistent with recent years.

Progress on goals.

Stated **Teaching Goals** for 2015–2016 were to 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, and to maintain or improve completion rates in Gen-Ed MATH.

The goal to accommodate students was made slightly prematurely in that 2015–2016 was actually a planning year in which the course AS 103, *Quantitative Foundations* was created, and arrangements were made to use ALEKS software to prepare students in AS 103 for MATH 120 beginning in Fall 2016. The course is now running in Fall 2016, funded through the Provost's office. The enrollment in AS 103 is 134 students, lower than anticipated—despite significant efforts to disseminate information about the course prior to new student registrations—likely due to the inertia overcoming the practice of putting such students in CCDM courses. Another major obstacle was getting a contract with McGraw-Hill approved in time to get students access to ALEKS beginning the first day of class. Of the several bottlenecks in this process, concerns about ownership of data and FERPA, exacerbated by lack of information regarding the approval process, seemed to cause the biggest holdup.

Means Pass rates (A,B,C relative to initial enrollment) for Fall 2015 were as follows: MATH 120 56% (52% in Fall 2014); MATH 121G 52% (63% Fall 2014*), MATH 142G 60% (72% in Fall 2014); MATH 190G 60% (63% Fall 2014); MATH 191G 61% (68% in Fall 21014) MATH 192G 67% (67% Fall 2014) MATH 210G 82% (87% Fall 2014) MATH 291G 65% (75% Fall 2014). Pass rates were down in most courses. It appears that much of the fluctuation resulted from a few temporary instructors having very low course means in Fall 2015 whereas different temporary instructors had unusually high course means in Fall 2014.

Stated **Research Goals** for 2015–2016 were (1) involve each graduate faculty member in peer-reviewed work either submitted or accepted or performed in a suitable Boyer context in 2015–2016, (2) continue to have about three-quarters of the tenure-track faculty publishing original mathematical research and (3) maintain current levels of funded activity with the aspiration of having all tenure-track faculty involved in externally funded work or in seeking funding.

As noted above, all but four tenure-track faculty had new articles published, accepted or submitted and the overall level of publication was unusually high in 2015-2016. All but five tenure-track faculty were involved in externally funded activities and the overall level of funded activity was moderately above that of 2014-2015.

The stated **Service Goal** for 2015-2016 was to 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. Ten tenured faculty were not on sabbatical, some of whom had heavy departmental service obligations, especially Dante DeBlassie, while a few persons did the lion's share of departmental representation on various College and University committees and task forces, most notably Mary Ballyk and Pat Morandi. Abby Train also was heavily involved in university service.

The stated **Program Goal** for 2015-2016 was to continue to graduate four or five PhDs and about 10 or 12 MS and BS students per year. The numbers reported above were 2 PhDs (but the two-year average was on par with the goal), 7 MS degrees, below the goal and recent average, and 14 BS degrees, above the goal and recent average.

Mathematical Sciences Goals for 2016–2017:

The Department of Mathematical Sciences is currently working on a self-study for an upcoming academic program review scheduled for Fall 2017. The department anticipates a significant five-year plan emerging from this review. As such, departmental goals for 2016-2017 will effectively be maintenance goals.

Teaching Activities: The department plans to continue to run AS 103 in Fall and Spring and to assess student success in this course in terms of readiness for MATH 120 or beyond. The department was also asked to administer some form of the Math Placement Exam in local high schools.

Teaching Goals: Have students who successfully complete AS 103 subsequently successfully complete MATH 120 or a Gen-Ed MATH course at a rate comparable or above current pass rate of about 60%. Compare subsequent performance of AS 103 students with students coming through CCDM courses. Maintain or improve completion rates in Gen-Ed MATH courses.

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

Research Goals: Involve the vast majority (80 to 90 percent) of graduate faculty members in peer-reviewed work either submitted or accepted or performed in a suitable Boyer context in 2016–2017. Maintain current levels of funded activity with the aspiration of having 80-90 percent of tenure-track faculty involved in externally funded work or in seeking funding, with the remaining 10–20% involved in extraordinary service or outreach.

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 members 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. Begin discussion of revisions to graduate programs.

Program Goals: Continue to graduate four or five PhDs and about 10 or 12 MS and BS students per year. Make progress on updating information on web pages to make programs more attractive to potential students. Write a comprehensive self-study.