Department of Mathematical Sciences

To: Enrico Pontelli, Dean, Arts and Sciences

From: Joseph Lakey and Robert Smits, Academic Department Heads

Date: 17 November 2017

Subject: Department Summary and Analysis for 2017–2018 and Goals for 2018–2019

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 one tenure-track resignation, that of Nick Michalowski, who moved away for family reasons, one College-Track resignation of Chris Stuart due to retirement, and an unexpected staff resignation of Abby Train, who took a position at Texas State University despite retention efforts. The department was able to do a tenure-track hire of Xuemei Chen as a spousal accommodation, replacing Shibin Dai. Chen and Jonathan Moñtano, who was hired through a tenure-track search in 2016-2017, have joined the faculty in Fall 2018. Not counting Michalowski who was, technically, on leave, the number of continuing faculty in 2017–2018 was 19 (-2) and 7.5 FTE college-track (--) relative to 2016–2017. For 2018–2019 the faculty numbers 21 tenure-track, including Lakey who has an interim assignment in the Dean's office, and 6.5 college-track. In 2017-2018 the department employed one visiting assistant professor (Brantley) and seven different temporary instructors (Wanda Bulgur-Tamez, India Dytzel, Ying Wang, Tim Hannan, Rita Neumann, Jose Espinosa-Tintos and Michael DeAntonio). In Spring 2018, only two temporary instructors were needed. The department has two Visiting Assistant Professors in 2018–2019 (Brantley and Abu-Rqayiq, in slots vacated by Michalowski and Stuart). Mary Ballyk has assumed the duties of Director of First Year Math after Train's resignation.

Sabbaticals and course coverage : The department had one full-year sabbatical (Stanford) and one Spring only sabbatical (Morandi). Michalowski was technically on leave without pay in 2017–2018. In Fall 2017 the department had two tenure-track FMLA cases that required coverage of four courses. Consequently, besides hiring Kristina Brantley, a PhD candidate, as a Visiting Assistant Professor, the department also hired seven temporary instructors in Fall 2017 to cover the needs that arose above the usual need for a few temporary instructors when the department is otherwise at full capacity.

Summary of Department Accomplishments

Externally Funded Activities. According to 2016 HERD data[1], NMSU ranked 240th in federally financed higher education R&D in mathematics and statistics in 2016, down further from 206th in 2015 and 118th in FY2014 and significantly down from an inflated ranking in the upper 20s in 2013 when the LIFT program was funded by NSF-DUE at $1M/yr. Net federal funding was just $124K in 2016 vs 216K in 2015 and 969K in 2014 (funding from all sources was 191K in 2016, 274K in 2015 and 1080K in 2014). The current decline will continue for a few years because Dai and Michalowski, who have left the department, were the only two with current NSF research grants in 2016. Recommendations of last year's department review included factoring application and award of funded activities more prominently in annual reviews.

Faculty involvement in external funding will be reported as follows. First new, ongoing and closeout ARGIS funding will be reported, taking data directly from Digital Measures. Non-ARGIS funded programs will be identified next with information on funding agency and home institution. Proposals submitted in 2017–2018, declined or under review, will then be reported to give a comprehensive view of faculty roles in external funding and its pursuit.

New funding beginning in 2017–2018

Harding, John (Principal), "Edinburgh Workshop on Quantum Theory," Sponsored by Foundational Questions Institute, Other, $1,500.00. (December 28, 2017 - August 1, 2018).

Ongoing funding current in 2017–2018

Contreras, Andres (Principal), "Topological-Defects in Nonlinear Elliptic Problems," Simons Foundation, $14,000.00. (September 1, 2016 - August 31, 2021).

Fouli, Louiza (Principal), "Parameters, Blowup Algebras and Connections to Combinatorics," Simons Foundation, $35,000.00. (September 1, 2012 - August 31, 2018).

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

Bulger-Tamez, Wanda M. (Principal), Kanim, Katherine W. (Co-Principal), Matthews, Lisa R. (Co-Principal), **Morandi, Patrick J.** (Co-Principal), "FY17 MSP PED-MC2," NM PED, $1,203,114.00. (April 7, 2017 - September 30, 2018).

Wiburg, Karin (Principal), Trujillo, Karen M (Principal), Chamberlin, Barbara Anne (Co- Principal), **Stanford, Theodore B.** (Co-Principal), "Math Snacks for Early Algebra – Using Games & Inquiry to Help Students Transition from Number to Variable," NSF, $2,999,995.00. (September 1, 2015 - August 31, 2019).

Tian, Jianjun Paul (Principal), "Internal Award - FY18 PACR P8 Solid Tumor," Other, $76,833.00. (September 1, 2017 - August 31, 2018). [This is an annual subaward of "Partnership for the Advancement of Cancer Research: NMSU/FHCRC," HHS/NCI/NIH(DHHS), Other, $5,114,643.00. (September 25, 2013 - August 31, 2018).]

1 https://ncsesdata.nsf.gov/herd/2016/html/HERD2016_DST_46.html

Funding ending in 2017–2018

Lakey, Joseph (Principal), **Cahill, Jameson** (Co-Principal), "CBMS Conference: Sparse Approximation and Signal Recovery Algorithms," Sponsored by NSF, $38,399.00. (January 1, 2017 - December 31, 2017).

Bulger-Tamez, Wanda (Principal), Kanim, Katherine (Co-Principal), Matthews, Lisa (Co-Principal), **Morandi, Patrick** (Co-Principal), "FY16 MC2 PED," Sponsored by NM PED $1,300,185.00. (October 19, 2015 - September 30, 2017).

Tian, Jianjun Paul (Principal), "Collaborative Research: New Formulation & Algorithms for Fluid-Structure Interaction with Application to Tumor Growth," NSF, Other, $111,511.00. (May 21, 2014 - August 31, 2017).

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. Award amounts do not necessarily reflect any expenditures associated with NMSU.

"FY17 MSP PED-MC2," NM Public Education Department, $1,203,114.00, Description: Kanim, K. W. (Co-Principal), Matthews, L. R. (Co-Principal), Bulger-Tamez, W. M. (Principal), Morandi, P. J. (Co-Principal), **Mary Ballyk, participant**. Status: Funded, Effective Dates 4/7/17–9/30/18.

"FY16 MC2 PED," NM Public Education Department, $130,018.50, Description: Kanim, K. W. (Co-Principal), Matthews, L. R. (Co-Principal), Bulger-Tamez, W. M. (Principal), Morandi, P. J. (Co-Principal) **Mary Ballyk, participant** Status: Funded, Effective Dates 10/19/15–9/30/17.

Guram Bezhanishvi, "Propositional calculi for topology and geometry," Shota Rustaveli National Science Foundation (Georgia), $86,326.00, Funded, Effective Dates: 1/17–1/20.

Guram Bezhanishvili, John Harding, Pat Morandi, Bruce Olberding, "SYSMICS: Syntax meet semantics: methods, interactions, and connections in substructural logics," Horizon 2020 (European Union), $550,000.00, Funded, Effective Dates: 3/16–3/19.

Louiza Fouli, "iCredits: interdisciplinary Center of Research Excellence in Design of Intelligent Technologies for Smartgrids," National Science Foundation, $4,999,721.00, Status: Funded, Effective Dates: 2/1/14–1/31/19.

Louiza Fouli, "Southwest Local Algebra Meeting 2018," NSF (through Univ. Arkansas), $10,000.00, Description: Funds supported the annual Southwest Local Algebra Meeting (SLAM) that was held at University of Arkansas in February 2018., Funded, Effective Dates 1/1/18–12/31/18

Louiza Fouli, "Southwest Local Algebra Meeting 2017," NSF, $15,130.00, Description: Funds supported the annual Southwest Local Algebra Meeting (SLAM) that was held at University of New Mexico in March 2017., Funded, Effective Start Date: January 1, 2017, Effective End Date: December 31, 2017.

Tiziana Giorgi, "Faculty Travel Grant," NMSU College of Arts & Sciences, $750.00, Description: Award intended to support participation in the SIAM (Society of Industrial and Applied Mathematics) Materials Science Conference held from July 9-13th, 2018, in Portland,

Ted Stanford, "Mathematically Connected Communities (MC2)," Department of Education, Description: Collaboration between Mathematicians, Math Educators, and K-12 teachers., Effective Dates: 2004–6/18.

J. Tian, "Ebola virus: mechanisms of transmission, epizootic and epidemic," NSF, $200,000.00, Description: This was a RAPID proposal (one-page proposal submitted by email) Not Awarded, Effective Dates: 8/18/14-8/17/18

The faculty of Mathematical Sciences were involved in other ARGIS applications in 2017-2018 either under review or not funded. The following were reported by faculty on their annual reports.

Lakey, Joseph (Principal), "Analogues of Time and Band Limiting on Graphs," NSF, $115,369.00. (July 1, 2018 - December 31, 2018). Not funded.

Xu, Jiannong (Principal), Hansen, Immo A (Co-Principal), **Wang, Tonghui** (Co-Principal), Hanley, Kathryn A. (Co-Principal), "Aedes albopictus: gut metagenomic variability and dengue susceptibility," HHS/NIH, $3,625,310.00. (April 1, 2018 – March 31, 2023). Currently Under Review

Song, Mingzhou (Principal), Cao, Huiping (Co-Principal), Bailey, Donovan (Co-Principal), Pontelli, Enrico (Supporting), **Wang, Tonghui** (Supporting), Zheng, Mai (Other), "RII Track-2 FEC: Genomes, genes and environmentally driven convergent evolution from dry to fleshy fruits," NSF, $6,000,000.00. (August 1, 2018 - July 31, 2022). Currently Under Review

Altogether, all but 6 of the 21 ongoing tenure-track faculty members were involved in externally funded activities in 2017-2018 (all but seven were involved in 16–17, all but five in 15–16).

Research and Creative Activity (2017-2018). Based on faculty APRs, the number of journal articles published or accepted in 2017-2018 was 28. Nineteen additional journal articles were submitted. APRs also listed 11 book chapters and one other miscellaneous publication. One edited volume was published with a second in progress, and one co-authored monograph was published. By comparison, summary output in 16-17 included 40 unique journal articles published or accepted, twelve book chapters, four conference proceedings papers and one monograph. The decline in new journal articles is partly due to some recent retirements and resignations, but probably a bigger factor is that there was an artificial bump the last few years when some of the most prolific faculty members had sabbatical leaves that enhanced their outputs. Only three tenure-track faculty did not publish or submit new work in 2017-2018, compared to six in 2016-2017.

Other Scholarly Activities (2017–2018). The department had some official visitors in 2017-2018, but not all of these were reported on APRs. There were significantly fewer departmental colloquia than in 2016-2017 when there were an unprecedented 16 colloquia, including three interview talks. The department hosted just three colloquia in 2017-2018, as follows: Tái Huy Há, Tulane University, *Combinatorial structures through algebraic lenses* (Nov. 16, 2017); Ben Niu, Harbin Institute of Technology (China), *Two-parameter bifurcations in neutral functional differential equations* (Feb. 15, 2018) and Lia Bronsard, McMaster University, *On Saturn-ring defects in a nematic liquid crystal* (Mar. 29, 2018). In addition to colloquia, the department had a good number of regular visitors both for the full academic year and for extended visits. Precise information is omitted here as it was not reported out in host APRs.

Mathematical Sciences faculty gave approximately 50 presentations to audiences in seminars and colloquia at other universities and at conferences and workshops, including several international presentations: Bezhanishvili presented at the ILLC seminar and at the Workshop on Duality in Amsterdam. Contreras presented at Séminaire EDP Toulouse. Harding presented at QPL in Halifax and Wang presented at the Joint Statistical Meeting in Vancouver. Tian and Wang were particularly active in China where Tian gave presentations

at universities in four different cities. Wang gave ten colloquium talks at different universities in China and Thailand along with conference and workshop presentations in these countries. Altogether, two-thirds of the tenure-track faculty members gave external presentations at conferences or workshops and colloquia at other universities in 2017-2018.

Awards, Recognitions and Leading Scholarly Service, 2017-2018. Jerry Lodder was recognized with an *Outstanding Faculty Achievement in Teaching*, in Spring 2018, nominated by J. Tian and completing a reciprocity that resulted in Tian's *Arts and Sciences Outstanding Faculty Research Award* in Spring 2017. Tian also successfully nominated Lodder for the MAA SW Section Distinguished Teaching Award for 2017–2018. Dante DeBlassie was an A&S winner of the Donald C. Roush Award for teaching excellence in 2018. Other reported recognitions included Robert Smits being named the Dr. John A. and Margy Papen Endowed Professor of Actuarial Science, effective January 2018 and a Daniels Fund Ethics Fellow effective May 2018; Villaverde being named a member of the Teaching Academy, and Lakey being named a Distinguished Reviewer of Zentralblatt Math (July 2018).

Some Mathematical Sciences faculty held several editorial positions. Current editorial board members include: Pat Baggett, *European Journal of Mathematics and Science Education*; Guram Bezhanishvili, *Rocky Mountain Journal of Mathematics*, *Journal of Language, Logic, and Computation*, *Tbilisi Mathematical Journal*, and *Studia Logica*. Louiza Fouli, *Rocky Mountain Journal of Mathe*matics (new 2017). John Harding, *Order*. Pat Morandi, *Journal of Algebra and Computational Applications*. Bruce Olberding, *Journal of Algebra and its Applications* (new 2017), and *Journal of Commutative Algebra*.

Bezhanishvili also lists himself as a Committee member or conference track organizer for *TbiLLC 2019*, *BLAST*, *TOLO*, *TACL*, *AiML 2018*, and *TOLO 2018*. Harding is on the Advisory Board of *Math. Slovaka* and was Vice-president of IQSA (formerly President).

All but four tenure-track faculty members reported doing editorial reviews of journal articles and/or reviews of grant proposals. Close to half the tenure-track faculty members reported reviewing a half-dozen or more such works. One faculty member reported writing two external reviews for tenure and promotion.

A few faculty members (co)-organized conferences and workshops: Fouli co-organized SLAM 2018 (U. Arkansas); Giorgi organized workshops or minisymposia at the Canadian Math Society summer meeting in July and at the SIAM meeting in Scottsdale in December. Locally, Villaverde and Wang organized the 22nd joint NMSU/UTEP Workshop.

College and University Service, 2017-2018. Several Professors in Mathematical Sciences served as external members of other departmental Promotion and Tenure committees, including: Giorgi, Geology P&T; Lodder (starting January) and Morandi for Psychology; Mostafa (Biology, College-track); Olberding (Philosphy); and Wang (Sociology).

Other Mathematical Sciences participants on Arts and Sciences committees included Ballyk (Faculty Affairs), Baggett (Travel grants, ending August 2017); Giorgi (A&S Graduate Affairs), Morandi (A&S Research Affairs, Chair); Mostafa (A&S College-track promotion);

Olberding (sabbatical replacement on Research Affairs); and Zimmerman (rotating off A&S College-track promotion).

Mathematical Sciences faculty also participated on university level committees, or represented NMSU on state level task forces, including: Ballyk (University Faculty Fellow through May and Housing and Student Life Committee); Fouli (Gen Ed Course Certification and Interstate Passport Committees), Fulte (NMATF Chair and NMMATYC Executive Board member); Harding (University Research Council); Lakey (Aggie Pathway Task Force and Team 6); Morandi (General Education Task Force); Stanford (New Mexico Partnership for Math and Science Education) and Wang (Advisor to Badminton Club, Recruiting in China).

Faculty reported a variety of **outreach** activities, mostly work with local schools. Pat Baggett hosted field trips from Sierra Middle School and she participated in the Jornada Elementary STEAM night in March. Morandi and Olberding brought several activities to the Sonoma Elementary STEAM night in February. Lakey participated in the Valley View Elementary Math and Science Night in February and the Alameda Elementary Career Day in March and White-Hosford organized a Math-Theatre classroom lesson at Columbia Elementary in May. Other outreach included Salamanca-Riba and Lakey screening applicants separately for MIT and U. Chicago, providing opportunities also to let applicants know what NMSU can offer. Mostafa served as a Head Judge for the Southwestern Regional Science and Engineering Fair in Las Cruces. Lodder cited his work with educators and undergraduates at Ursinus college in conjunction with his work on historical sources as outreach, and Smits mentored a junior faculty member at USC through the Society for Mathematical Biology.

Student credit hour production. Enrollments in MATH/STAT courses declined for the fifth consecutive year. Fall census numbers for 2013–2017 were 13,423, 13,203, 12,692, 11,974, and 11,763 respectively. Fall 2018 census numbers were 11,702, down 0.5% from Fall 2017. Graduate enrollment stabilized (320 SCH in FA18 vs 319 SCH in FA17); however, upper division enrollments continue to hemorrhage: 861 SCH in FA18 vs 1143 in FA17, a 25% one-year decline and part of a relative 43% decline since Fall 2015. The majority of this decline is in MATH 291G, MATH 392 and MATH 480, previously core or preferred elective courses for different engineering majors. There is also a large decline now in STAT 371. While there has been an increase in SCH in AS 103, there is a significant amount of uncertainty about what will happen with AS 103 moving forward because of uncertainty of continued funding from the Provost office and because losing Abby Train means losing institutional expertise on how Area II outcomes of students who take the course might be improved.

As in recent years, the College Faculty members of Mathematical Sciences continue to process very heavy loads, including Ausbrooks (1029 SCH), Fulte (1317 in-load), Mostafa (1320 in-load), Villaverde (879), White-Hosford (924) and Zimmerman (1572, including AS 103). In contrast, only two tenure-track faculty members taught over 500 SCH in-load (Olberding, 588 and Cahill, 543). Several of the tenure track faculty taught less than 250 SCH.

Majors and Degrees 2017-2018. The department produced a low number (totally 18) of degrees in 2017-2018, including five BS (Judah Cleveland, Diana Cochran, Lauren McKim, Jesus Rivas and Danielle Robinson); 10 MS degrees (Haneen Alayed, Abeer Alsaedi, Eti

Baffoe, Radieah Banihani, Taylor Bosier, Owusu Dankwah, Isis Gallardo, Abdul Hakeem Omotayo, Felipe Palma, and Farhana Sarower); and three PhDs (Abdullah Abu Rqayiq, Ibrahim Jawarneh and Qianning Liu). The number of PhDs is consistent with the last couple of years. The number of MS degrees is consistent with historical averages but the number of BS degrees is down significantly from the average of about ten degrees per year (fourteen each of the previous two years). On a positive note, degree recipients are a relatively diverse group, for example, four of the five BS recipients are female and three of the five are Hispanic.

Progress on Stated Goals for 2017/18 Year

Departmental goals for Teaching, Research and Service were formulated primarily as annual goals to complement anticipated feedback on the program review that occurred in Fall 2017.

Progress on Teaching Goals for 17–18. *Goals were to have students who complete AS 103 subsequently complete MATH 120 or a Gen-Ed MATH course at a rate comparable to or above current pass rate of about 60% (retained from 2016–2017) and maintain or improve completion rates in Gen-Ed MATH courses (retained from 2016–2017).* Unfortunately, with turnover in the position of Director of Math Success/First Year Math, measurement of progress on completion of a subsequent course for students beginning in AS 103 was not accomplished. One observation though was that students who took AS 103 in the Spring full-semester did not do well: a 38% pass rate. We already had evidence from the previous year that repeating AS 103 was not a good prognosis for passing AS 103. A report giving the current state of progress of AS 103 was provided to the Provost on June 22, 2018 with a copy to the Dean of Arts and Sciences.

Completion rates for MATH 210G (83% in FA 17 vs 85% in FA 16) remain high and for STAT 251G (64% in FA 17 and approximately 70% in FA 16) remain high. The STAT 251G results are disturbing, however because, while this course has uniform exams, some instructors had pass rates well above 80% while others had pass rates around 40%. This difference exceeds what can be explained by instructor effect, but might indicate variance among sections in student access to information regarding types of questions to be asked on exams.

Pass rates for MATH 190G (56% FA 16 and 60% FA 17) were on target with the goal. Those for MATH 191G (47% FA 16, 55% FA 17) were modestly off the goal while those for MATH 192G (44.5% FA 16 and 62% FA 17) might be explained by tougher standards in 191G the prior few semesters. Finally, pass rates in MATH 121G improved slightly but remain a challenge (46% FA16, 49% FA17).

Progress on Research Goals for 17–18. *Goals were to 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 2017–2018 and to increase numbers of ARGIS proposals for external research funding relative to 2016–2017.* As stated above, all but four tenure-track faculty members were involved in research submitted or accepted for publication in 2017-2018 (just below 80%) where as six did not show activity in 2016-2017.

On the other hand, ARGIS proposals were down. Overall, progress on research goals can be regarded as mixed.

Progress on Service Goals for 17–18. *Goals were to 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. Move toward an expectation of tangible enhancement of processes or programs through NMSU service.*
A substantial overhaul of the MS program in Mathematics and agreement on a substantial overhaul of the PhD program was led by the departmental Graduate Studies Committee, with the concurrence of most of the tenure-track faculty. The Undergraduate Curriculum and Teaching Committee leadership also worked very hard especially on institutionalizing Calculus Readiness Exams, and the Majors and Minors Committee Leadership continued to see to the needs of our undergraduate majors. These efforts boiled down to a substantial undertaking by a fraction of the faculty. Participation on College and university level committees was ample, but not necessarily broad. While service in the interests of scholarship remained very strong, that service did not address the specific nature of the service goals, to enhance the educational mission. Thus, while the quantity of departmental and university service was large, the distribution among faculty was not even. Part, but not all, of this unevenness amounted to protection of junior faculty members to allow as much time for research as possible. Given the current reality, the department is looking into ways to reward those faculty who contribute the most to the educational mission in ways that do not promote their own standing in the broader mathematics research community.

Progress on Program Goals for 2017-2018
Program goals were to continue to graduate four or five PhDs and about 10 or 12 MS and BS students per year, continue to make progress on updating information on web pages to make programs more attractive to potential students, have department discuss and decide on proposed modifications to the MS program, and begin to incorporate feedback from external review in October into a five-year action plan. In retrospect, a numerical goal for numbers of students completing various degree programs is better averaged over some number of years. The goal was barely met at the MS level with 10 MS completions, but was not met at the BS level (5) or PhD level (3). Three PhDs per year perhaps is realistic and consistent with what is considered a small PhD program in terms of numbers of faculty and students by the American Mathematical Society. However, if the relatively small number of BS completions this year continues, the department may need to consider options to make the program more attractive to a broader population of NMSU undergraduates. The department did make important changes, led by the Graduate Studies Committee, to revise its MS and PhD programs effective with the 2019 catalog.

Goals for 2019-2020

Teaching Activities: Continue to deliver high quality instruction in courses that serve all majors at NMSU. Continue to develop a more focused curriculum at the Master's level and a curriculum that optimizes breadth versus depth for PhD students.

Teaching Goals for 2019-2020: Teaching goals focus on course coordination ranging from MATH 120 to MATH 291G and perhaps MATH 392. Wide variance of pass rates across instructors in lower level courses is evidence that students in different sections of these courses are being unequally served by the department. For the coming year the department will focus on reducing variance of pass rates in lower division, multi-section courses rather than on increasing the pass rates themselves. Long term, the department would like to address coordination in its Functions and Criteria while not violating academic freedom.

Research Activities: Continue to produce high level, original scholarly work in Algebra and Foundations and broadly in Analysis and Probability and Statistics.

Research Goals for 2019-2020: The primary research goal is to increase the number of funding proposals produced with faculty as PIs or co-PIs, or as senior personnel on sensible interdisciplinary projects. Progress is to be measured relative to 2016-2017 baseline, in terms of numbers of new proposals as well as total research dollars requested.

Service Activities: The department's main standing committees serve the Undergraduate Majors and Minors, the Graduate Programs, and more broadly, the Undergraduate Curriculum and Teaching mission. Other major departmental service is through the Advisory Committee and Promotion and Tenure Committees. Service at the College, University and Professional level is done as needs arise.

Service Goals for 2019-2020: Rather than focusing on *more* service, the department will try to come up with reasonable guidelines to *reward* the necessary service that is done at the department, college and university level by its faculty at the cost of time that would otherwise be spent on creative activities. Another goal would be to come up with formal procedures to ensure that multi-section courses are coordinated in a manner that isn't burdensome to just a few faculty and also encourages consistency across sections.

Program Activities: in addition to usual advising, emphasis will be put on recruiting more undergraduate students to the major and retaining students. The primary mechanism will be to provide information about the major in classes ranging from MATH 190G, Precalculus to MATH 291G. The courses MATH 192GH, MATH 279 and MATH 280 provide particularly good opportunities for this.

Program Goals for 2019-2020: Undergraduate program goals include a 10 percent increase in the number of new MATH majors measured in late Spring vs. the previous year. The primary graduate program goal is to recruit a stronger group of incoming graduate students to begin in Fall 2019, measured broadly by readiness to succeed in the Master's and

PhD programs. Measured against a 2016 baseline, the department would like to see a 5% increase in donations from a combination of alumni and emeritus faculty.