

THE MATH ALLIANCE: BUILDING A NATIONAL MENTORING COMMUNITY

STRATEGIES TO ATTRACT AND SUPPORT URM GRADUATE STUDENTS

Purdue University

February 10, 2022

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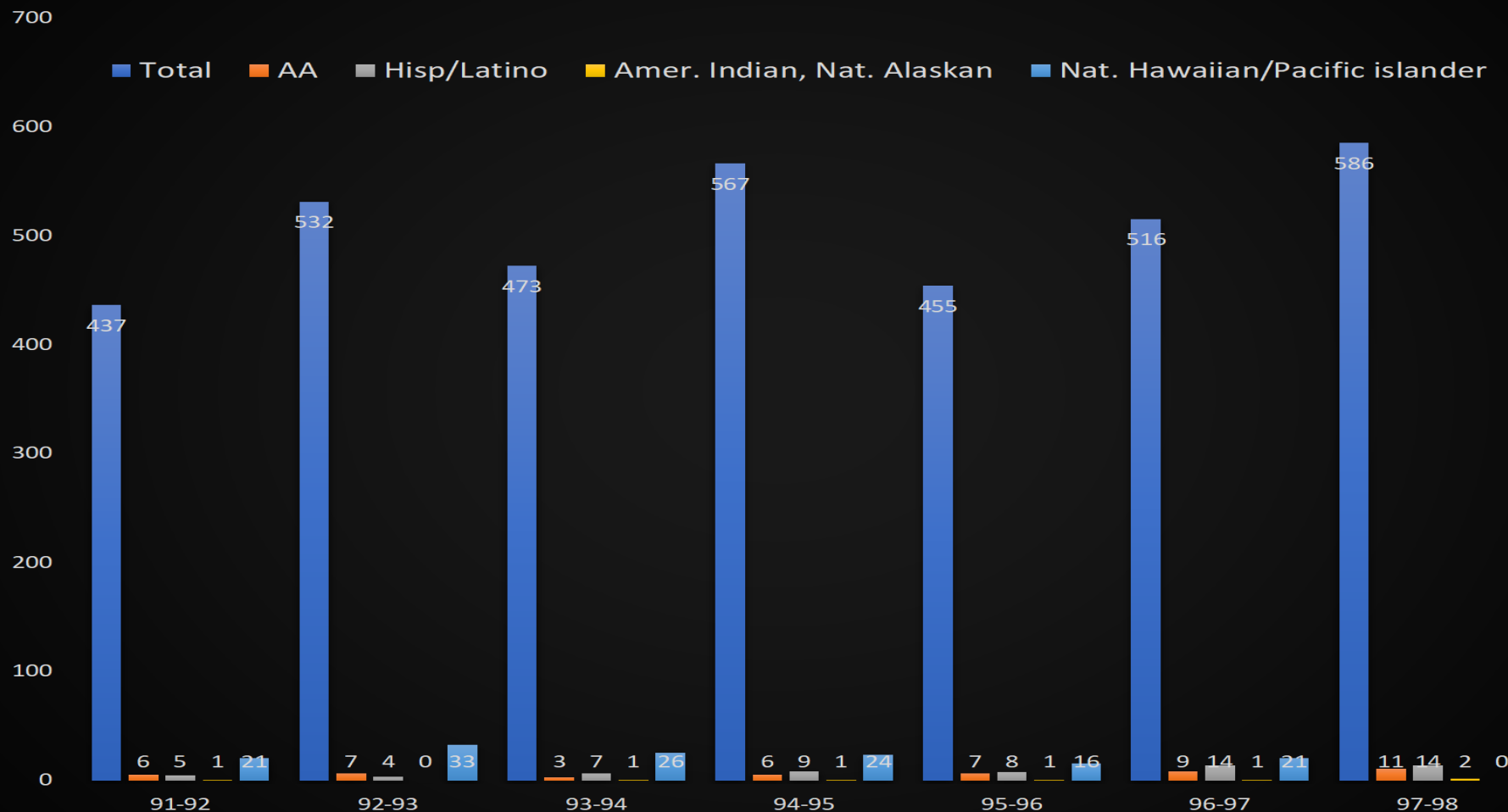
www.mathalliance.org

- I received my Ph.D. in 1991, from University of Maryland, College Park (UMD);
- In my 5 years there, UMD graduated 3 African American Ph.D.s in Math and Stat;
- Sometime in the few years after that, I did a “back of the envelope computation”;
 - Maybe 250-300 doctoral departments;
 - Maybe only half produced any minority doctorates;
 - Maybe UMD was producing more than average – suppose average department producing any, was producing 1 every 3 years;
 - “Maybe we’re only producing 50 minority PhDs per year”;
 - Maybe the average department produces 3(?) PhDs per year;
so, maybe ~900 PhDs, so maybe 6% URM PhDs...

That would be too few!!!!

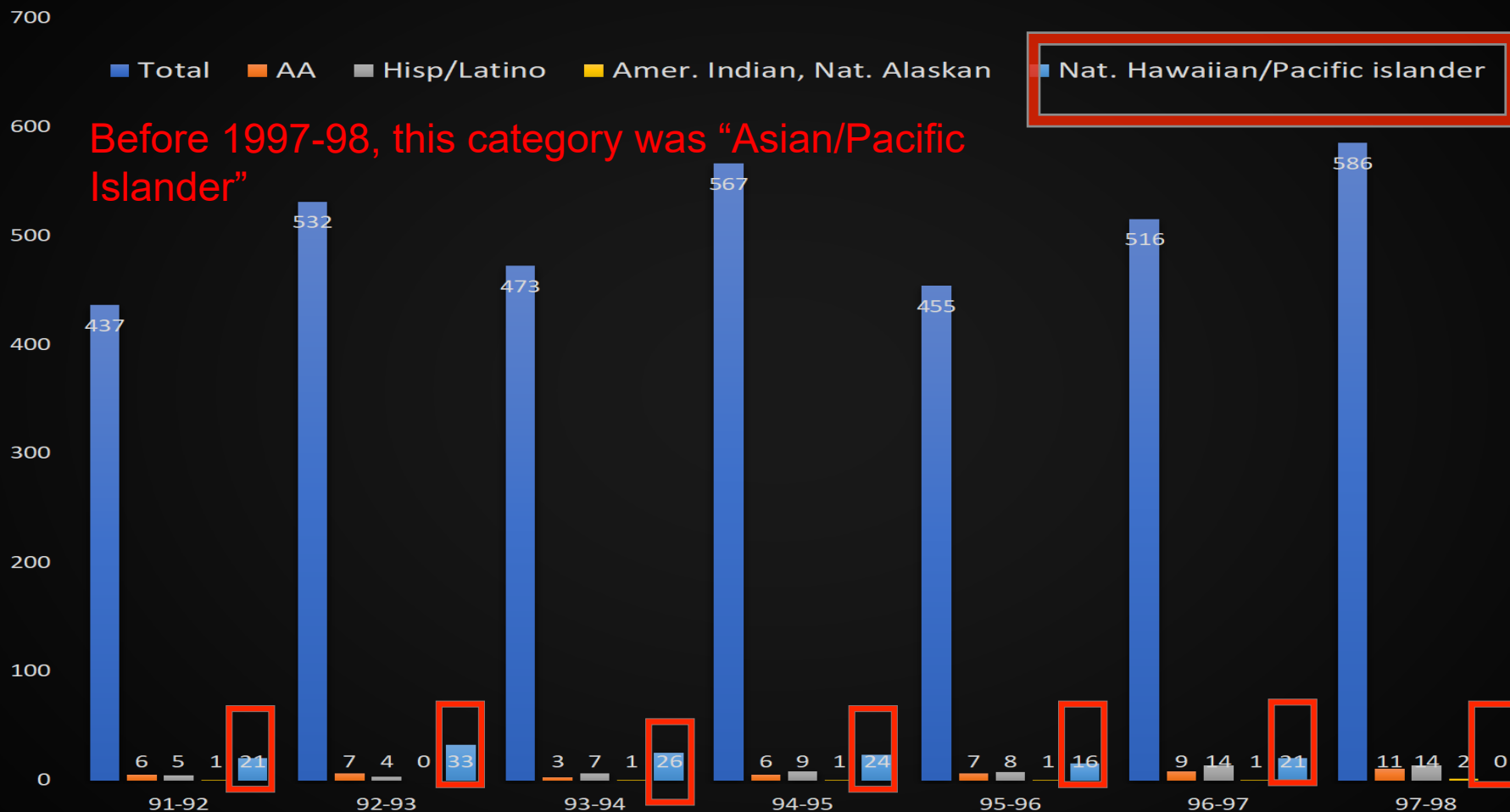
THE REALITY

U.S. Citizen Ph.D.s by Year 1991-98 AMER. MATH. SOC. DATA

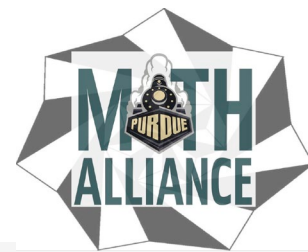


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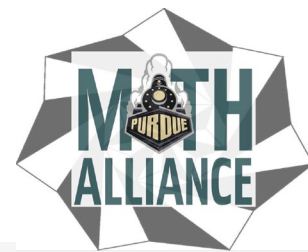


SOME ATTEMPTS AT PU MATH



- Around 2000, the Purdue Math Department tried to address its own lack of representation;
 - A Graduate Assistance in Areas of National Need (GAANN) grant was obtained to support minority students;
 - Several students recruited;
 - Limited success;
- An important lesson – good intention and willingness to make a difference is not enough;
- We were not the first place to try, and fail in this arena.

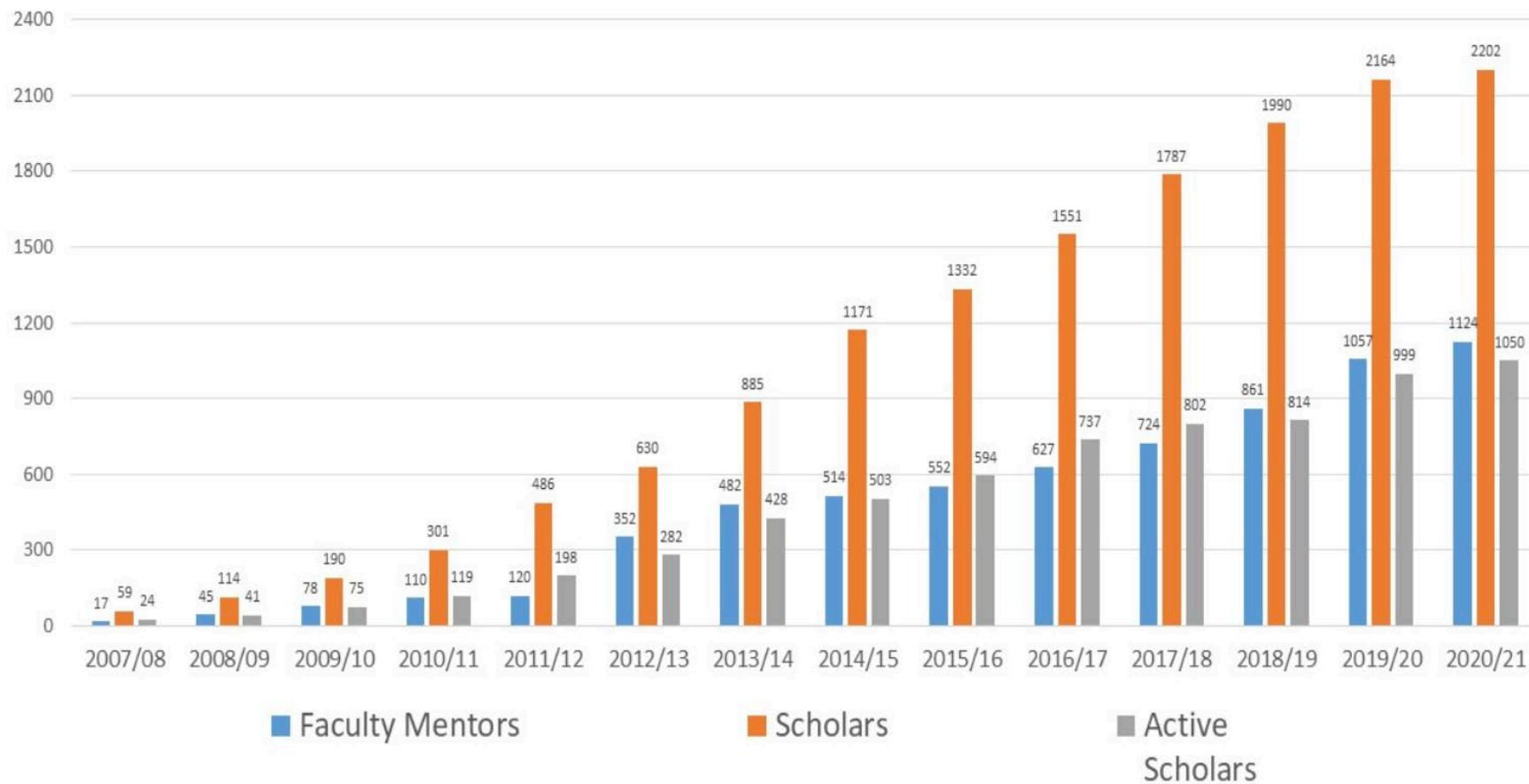
HISTORY OF MATH ALLIANCE



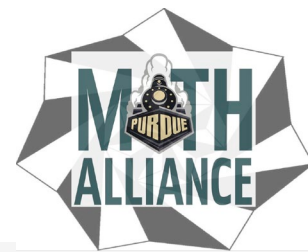
University of Iowa:

- 1995 Core group of faculty decide to actively recruit and mentor minority students.
- 2001 U. Iowa, Iowa State U., and Northern Iowa U. form *“Alliance for the Production of African American Ph.D.s in the Mathematical Sciences”* with Alabama A&M, Benedict, Florida A&M, and Jackson State. NSF Support secured;
- 2006 Increased success and need for more graduate programs;
- 2007 National Alliance for Doctoral Studies in Mathematical Sciences – first new programs are Arizona State U. and North Carolina State U. NSF supports this expansion;
- 2007-2015, Alliance grows rapidly.
- **AT EVERY STEP** in the [Alliance's History](#), there was intent to build a community, and this was of the highest priority. Whatever issues we have faced, the answers have always been found in our community building.
- **2016 Alliance moves its administrative home to Purdue;**
- **2017 Alliance wins Amer. Math. Soc. Programs that Make a Difference Award;**
- **2017- Alliance continues its growth and now looks for better ways to work with disciplines outside of our original domain.**

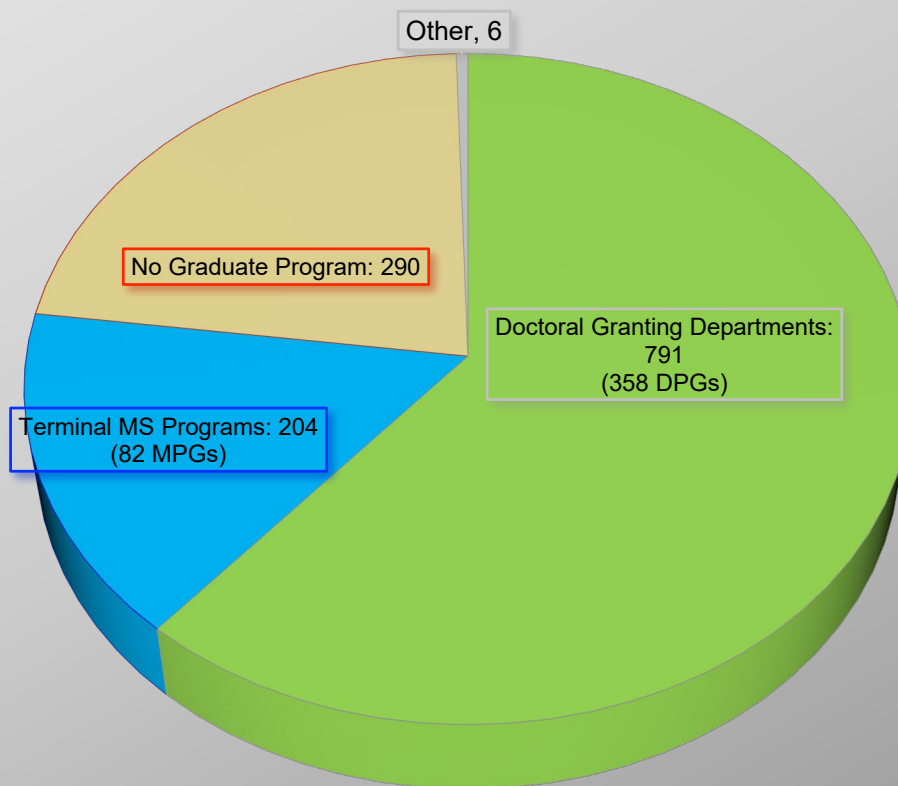
Growth of Alliance Mentoring Community



2022 Alliance Mentors by Department Type



WHERE OUR MENTORS COME FROM



HOW THE ALLIANCE WORKS

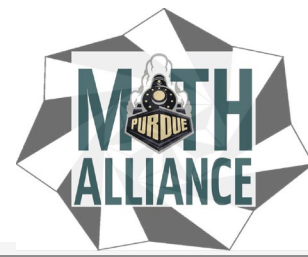


- Alliance is a community of Faculty Mentors and Scholars.
- Mentors are members of a quantitative science department at a U.S. college or university. They sign up at www.mathalliance.org.
- One of the main functions of mentors is to identify students who should be Alliance Scholars. These are students from backgrounds which can be described as “remote from professional science” who have the talent, and desire to pursue mathematical science doctorates.
- About 80% of our students are URM.



**Every student
comes into the
Alliance with a
mentor from their
home institution!**

BUILDING COMMUNITY: ALLIANCE PROGRAMS



- Facilitated Graduate Admissions Process (F-GAP);
- Graduate Program Groups;
- Regional Alliances;
- Field of Dreams Conference: “If you build it they will come.”
November 4-6, Minneapolis, MN



- In order to improve the transition from undergraduate to graduate programs, we developed the Facilitated Graduate Admissions Process (F-GAP).
 - Started in 2013-14;
 - Student paired with mentor in a doctoral program (facilitator), and this facilitates good placement in grad programs;

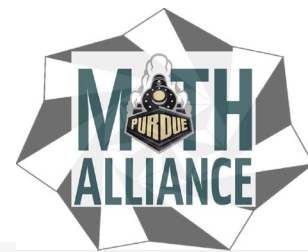


F-GAP OUTCOMES



- 813 students have participated since 2013-14;
- 38 doctorates earned to date;
- 254 Earned doctorates;
- 261 currently in doctoral programs;
- 97 Current MS students;
- Over 80% of participants have entered graduate programs;
- Helps make student “good consumers” of graduate programs.

GRADUATE PROGRAM GROUPS



Expansion of Alliance allowed the best practices U. of Iowa developed to be adapted to other programs:

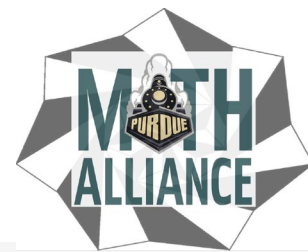
Arizona State U. and North Carolina State U. were the first to join the broadened Math Alliance, and they were already having considerable success with their own programs.

- New Math Alliance develops the notion of “Graduate Program Group” (GPG);
 - Group of faculty within a mathematical science graduate program;
 - Should initially comprise at least 10-15% of the Tenured/Tenure Track faculty in the department;
 - Should include support from chair, or at least graduate chair;
 - Sufficient structure to successfully mentor as many underrepresented minority students as they accept into their program;
 - They have a mentoring plan which Alliance Executive Council agrees is appropriate for that program.

- **NOTE: The Alliance does not encourage remediation, or ask programs to change their standards of admission or their academic expectations to become a Graduate Program Group.**
- Graduate Program Groups *do* change the culture and climate of programs.
- **Example: Purdue U. Mathematics:**
 - Fall 2009, Math Department attends first Field of Dreams Conference;
 - 2014 became a GPG;
 - Mentoring plan to mentor all fellowship students;
 - Fall 2015 expand mentoring program to all new U.S. Students and even some international students;
 - Fall 2017 – All new students get a mentor, in addition to their advisor.
 - We're now a department who mentors in a different way as part of our culture – and again, we made no change to our admissions or academic policies.
 - 10% of our U.S. Students are from underrepresented groups.

- From 5 GPGs in 2007, we now have 53 GPGs:
- 42 Doctoral Program Groups (DPGs)
- 11 Master's Program Groups (MPGs)
- Note, these MPGs are programs which have a demonstrated record of sending their MS students to Ph.D. programs, and having those students thrive in the doctoral program.

FIELD OF DREAMS CONFERENCE



The Math Alliance and
The Center for the National
Math Sciences Alliance
at Purdue University



2018 FIELD OF DREAMS CONFERENCE
Hosted by Washington University in St. Louis



November 2-4, 2018
Renaissance St. Louis Airport Hotel
St. Louis, MO

Keynote Speaker



Dr. Rodrigo Bañuelos
Professor of Mathematics
Purdue University

Featured Speakers



Dr. Peter Sarnak

Eugene Higgins Professor of
Mathematics, Princeton University
and Professor, The Institute for
Advanced Studies



Dr. Cristina Villalobos

Professor of Mathematics,
University of Texas Rio Grande
Valley and Founding Director of the
Center of Excellence in STEM
Education

Sponsored in part by:

PURDUE
UNIVERSITY



And Our Partner Institutions:

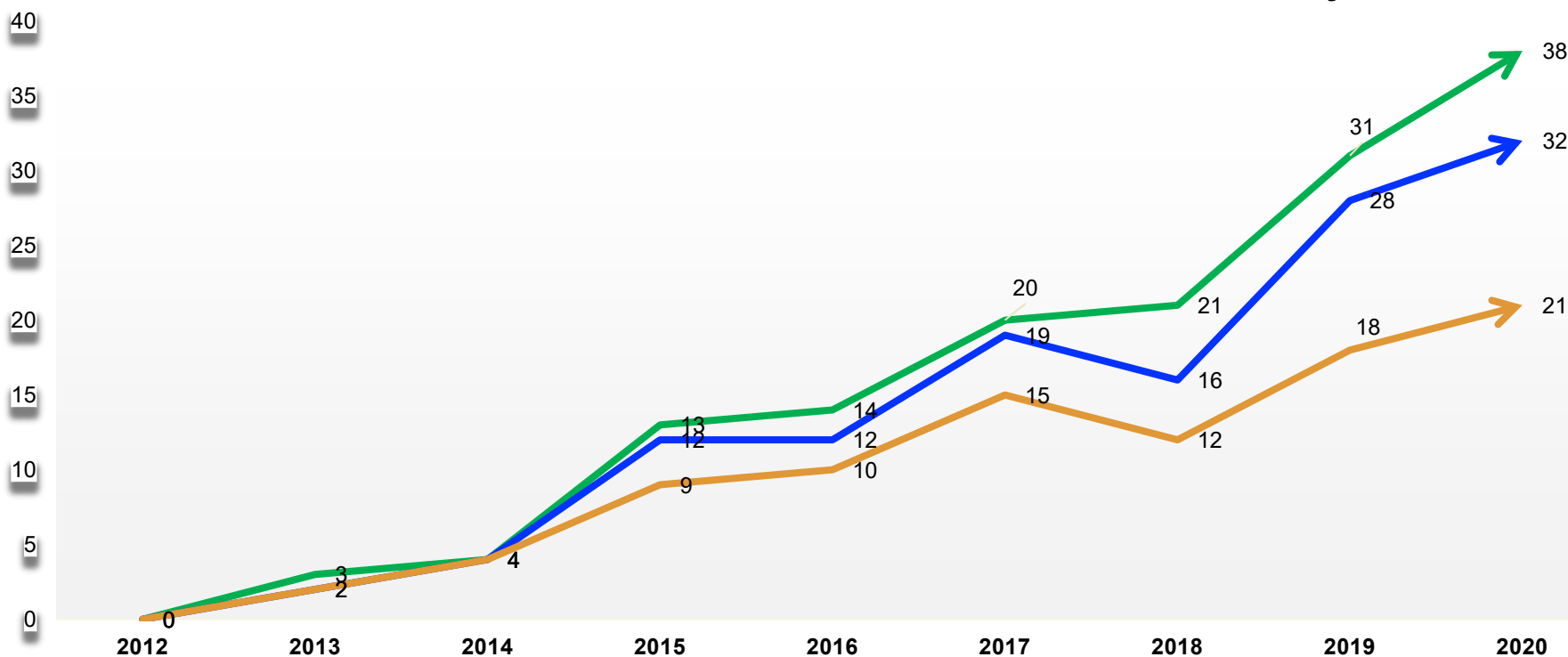

Washington
University in St. Louis


THE
UNIVERSITY
OF IOWA

For more information, visit our website: mathalliance.org

- **400 attendees:**
 - 200 undergraduate and terminal MS students;
- **Panels on grad school preparation and applications;**
- **Best mentoring practices;**
- **Graduate Program Fair:**
 - 60-75 graduate programs in a variety of fields;
- **Career Fair**
 - ~100 recent or finishing doctorates;
- **Community building.**
- **NOV. 4-6, Minneapolis**

Alliance Predoctoral Scholars PhD's Earned by Year



Predoctoral Alliance scholars earning a PhD in any field

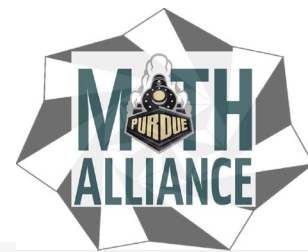


Predoctoral Alliance scholars with a PhD in a Math/Stat Science



Predoctoral Alliance URM scholars with a PhD in Math/Stat Science

PURDUE MATH DEMOGRAPHICS



Year	# Total Students	# US Students	% US Students of Total	# Int. Students	% Int. Students of Total	# Women Students	# AA Students	# Hispanic Students	# AI/Haw Native	
2008-2009	149	57	38%	92	62%	39 (11 US)	3 (1 F)	4 (1 F)	1 (0 F)	
2009-2010	163	61	37%	102	63%	40 (9 US)	4 (1 F)	4 (0 F)	1 (0 F)	
2010-2011	149	59	40%	90	60%	31 (7 US)	3 (0 F)	2 (0 F)	0 (0 F)	
2011-2012	159	72	45%	87	55%	34 (10 US)	3 (0 F)	15 (2 F)	0 (0 F)	
2012-2013	158	75	47%	83	53%	36 (12 US)	2 (0 F)	16 (2 F)	0 (0 F)	
2013-2014	159	80	51%	79	49%	35 (12 US)	2 (0 F)	13 (3 F)	1 (0 F)	
2014-2015	152	89	59%	63	41%	36 (17 US)	0 (0 F)	12 (1 F)	1 (0 F)	
2015-2016	142	88	62%	54	38%	36 (21 US)	1 (0 F)	10 (2 F)	1 (0 F)	
2016-2017	156	91	58%	65	42%	44 (21 US)	0 (0 F)	14 (4 F)	2 (0 F)	
2017-2018	171	106	62%	65	38%	47 (27 US)	2 (0 F)	12 (4 F)	2 (0 F)	
2018-2019	170	104	61%	66	39%	43 (25 US)	2 (0 F)	12 (3 F)	1 (0 F)	
2019-2020	166	104	63%	62	37%	44 (28 US)	3 (0 F)	13 (5 F)	1 (0 F)	
2020-2021	144	91	63%	54	37%	36 (26 US)	2 (F)	10 (4 F)	0 (0 F)	

SOME ALIANCE DOCTORATES WITH PURDUE CONNECTIONS



- Reginald “RB” McGee:
 - B.S. FAMU, 2009;
 - Ph.D., Purdue 2015,
Specialization:
Mathematical Biology
(Advisor G. Buzzard);
 - 2015-2018, Postdoc.
Math. Biosciences Inst.,
Ohio State;
 - 2018- Tenure Track
Assistant Prof., Holy Cross,
Worcester MA



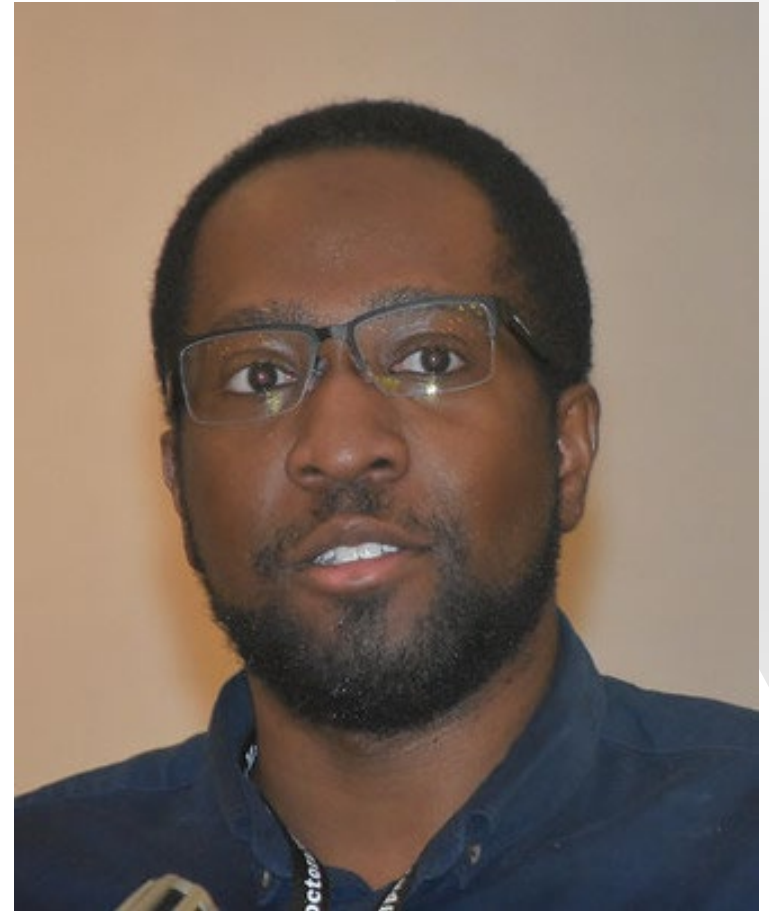
- Alex Barrios:
 - Sc. B, Brown U., 2011;
 - Ph.D., Purdue, 2018
Specialization: Number
Theory,
(Advisor E. Goins);
 - 2018- Scholar-In-Residence and
Fellow in Mathematics,
Carleton College, Northfield, MN



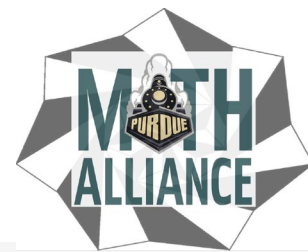
SOME ALLIANCE DOCTORATES WITH PURDUE CONNECTIONS



- Isaac Harris:
 - B.A. Kean U., 2010;
 - Ph.D. U. of Delaware, 2015;
Specialization: Inverse Problems
and Scattering Theory
(Advisor F. Cakoni);
 - 2015-18 Postdoc, Texas A&M;
 - 2018- Tenure track Assistant Prof.
Purdue University.



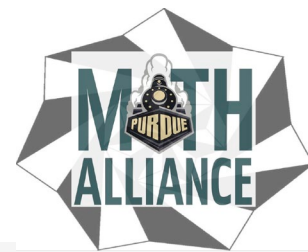
SOME ALLIANCE DOCTORATES WITH PURDUE CONNECTIONS



- Rolando de Santiago
 - B.S. Cal Poly Pomona, 2010;
 - M.S. Cal Poly Pomona 2012;
 - Ph.D. U. Iowa, 2017
Specialization: Operator Algebras
(Advisor I. Chifan);
 - 2017-2020 UC Presidential
Postdoctoral Fellow, UCLA;
 - 2020 Tenure track Assistant Professor, Purdue.



OTHER DISCIPLINES

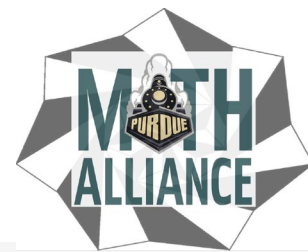


We hope to use our Partner Universities (Purdue, Arizona State Penn State, Minnesota, U. Washington ...) to build our work to appropriate departments on these campuses;

Ex: Here we are already working with other departments in College of Science, Krannert School of Management, discussions with Engineering...;

Several departments from other disciplines at many universities are already recruiting at Field of Dreams Conference – Business Economics, Biology, Engineering, Data Science....

ALLIANCE SUCCESS



Some keys to our success are:

1. Commitment from the beginning to students' experience being a good one;
2. Students come to us through one of our mentors;
3. Not driven by administrative priorities;
4. At first, growth was organic, by word of mouth;
5. Priority on our community – its development, growth, and health.