

# The Distance Mathematics Program

Celebrating Teaching Day Poster Session, Georgia Institute of Technology, March 2019  
 Dr. Greg Mayer, School of Mathematics, greg.mayer@gatech.edu, and Dr. Kate Williams, Center for Teaching and Learning

## Program Goals

- The Distance Mathematics Program (DMP) allows advanced high school students throughout Georgia to enroll in undergraduate mathematics courses
- DMP students engage in college classes and interact with faculty without having to travel to campus
- Students who complete DMP courses gain GT credit

## Partnerships

- The DMP is made possible through a collaboration between the School of Mathematics, Georgia Tech Professional Education, the Office of Undergraduate Admissions, and CEISMC

## First Year Admission

- Many of our DMP alumni matriculate to Georgia Tech
- Roughly 85% of DMP students are admitted into GT as first year students over the past 4 years (more than double the admit rate across GA)

## Year 2 Courses

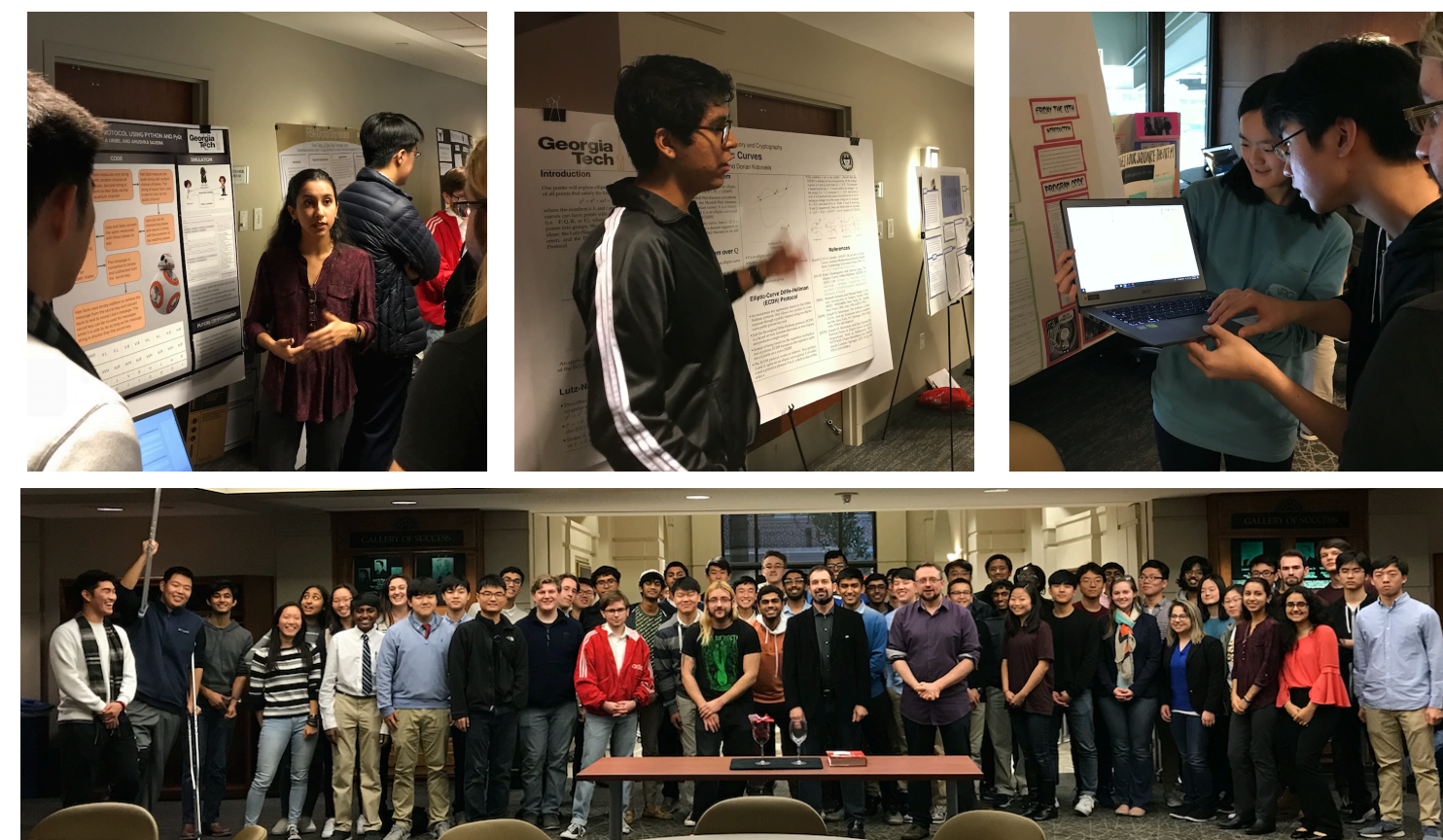
- Year 1 students who are juniors can apply for more advanced courses
- Asynchronous: all lectures are pre-recorded
- Over past four years, courses have included:
  - Math 3012 Applied Combinatorics (3 credits)
  - Math 2552 Differential Equations (4 credits)
  - Math 2803 Number Theory & Cryptography (3 credits)

number of applications and admitted Year 2 students

year	# applicants	# students enrolled
2014	19	19
2015	11	11
2016	23	19
2017	40	38
2018	61	59

## Number Theory Mini-Conference

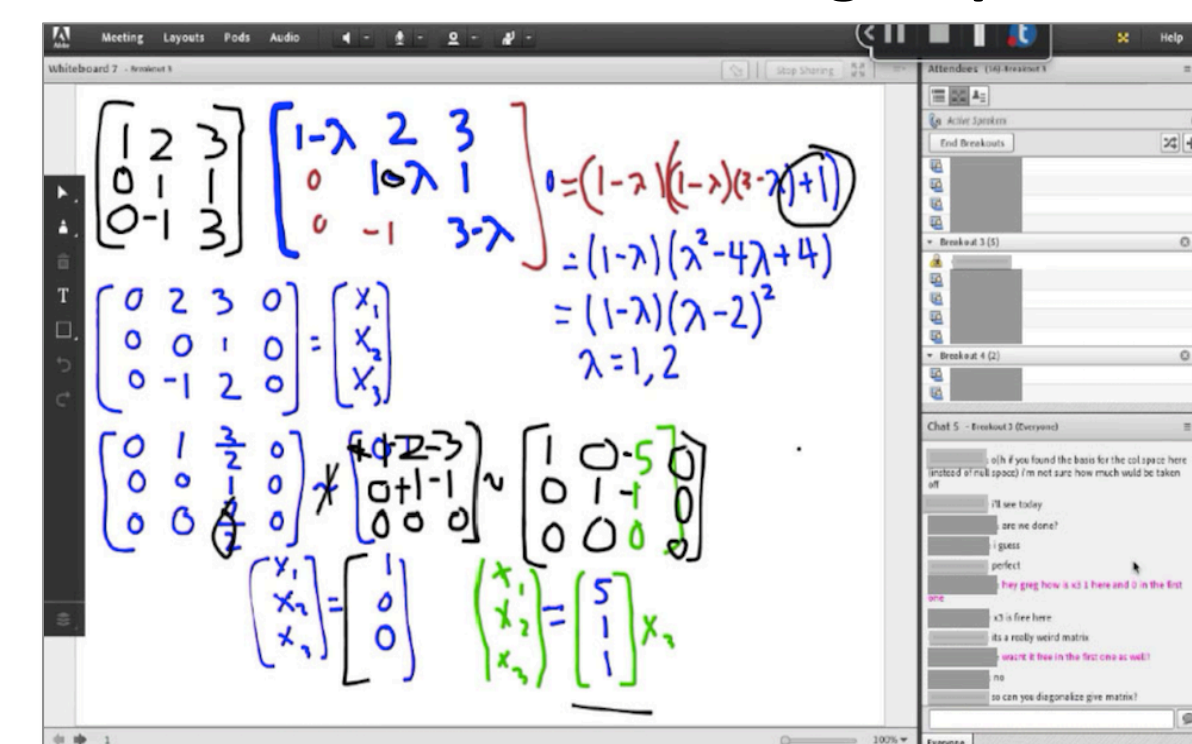
- Math 2803 students work in groups to research a topic related to number theory
- Students present their research at a small conference held on campus



## Building Online Community

- 15 to 20 of the Year 1 students each year are geographically isolated: they are the only DMP student at their school
- These students are placed in a recitation section that can accommodate group work
- Students can collaborate in real time through breakout rooms, white boards, group chat

screenshot of student group work



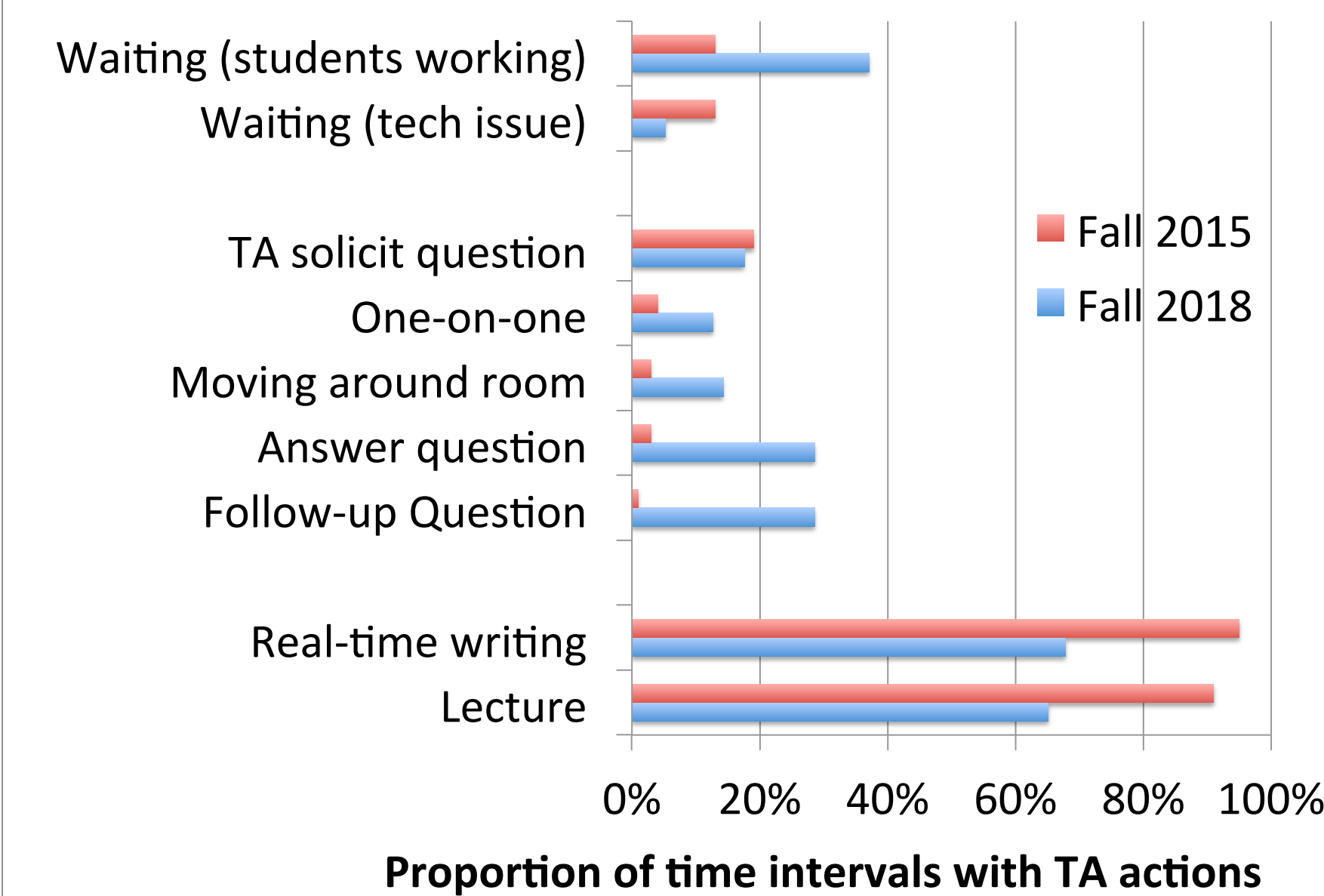
## Research and Evaluation

- Several publications and conference presentations over past five years, in collaboration with CEISMC and CTL, explore various aspects of DMP.<sup>[1,2,3,4,5]</sup>
- Survey, teaching observations, and interviews conducted in 2015, 2016, and 2018 to explore:
  - What teaching practices do our DMP TAs use in their recitations?
  - How do our TAs describe their experience facilitating recitation sessions in a blended learning environment?

## TA Teaching Observations

Observations conducted on recorded video using a version of the COPUS instrument<sup>[4,6,7]</sup>

Duration of recitations is 50 minutes, each recitation broken down into 2 minute intervals. We identified TA actions in each 2 minute interval.



Observed TA teaching practices in 2015 motivated development of curriculum and improved TA training and support. These efforts may have helped foster more active learning in recitations.

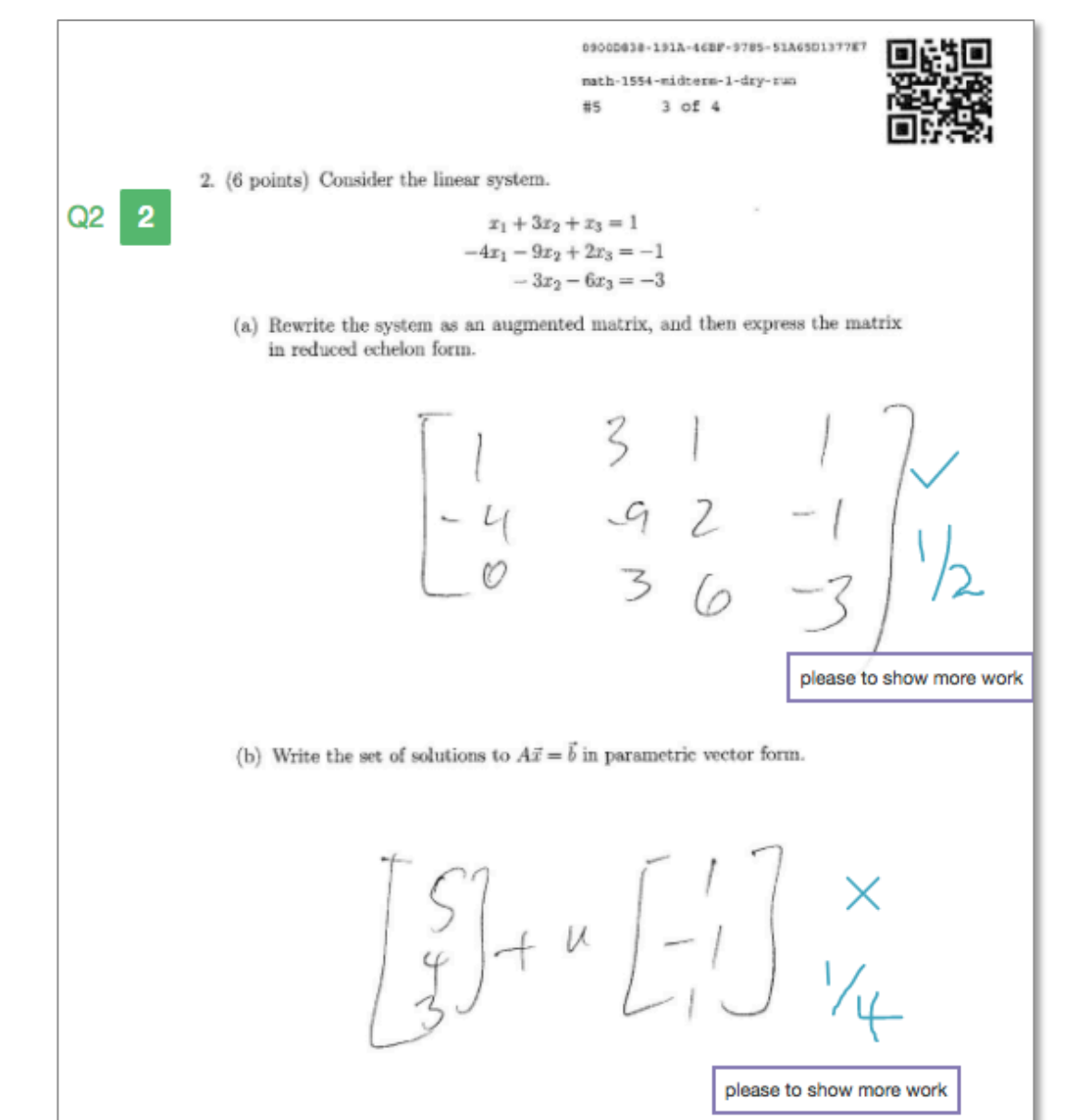
## Interview Data

DMP TAs interviewed in 2015, 2016, and 2018.

- Most TAs want **students** to be working on problems and to interact with their students during recitation
- 2015 TAs generally frustrated: did not have training and curriculum to foster active learning
- TA satisfaction improved as curriculum developed (recitation worksheets, TA Guide with teaching tips)
- 2018 TAs still unsure of how to best meet needs of both local and distance students simultaneously, and are often unsure of how to best interact with distance students during recitation

## Crowdmark

- Prior to Fall 2017
  - Exams were collected and returned via UPS
  - 2 weeks for exams to be graded & returned
  - Workflow limited exam length
- Crowdmark software used since Fall 2017
- Crowdmark workflow
  - Students write proctored exams on paper
  - Written exams are mailed to GT via UPS
  - Exams are scanned and graded online
  - Graded exams returned electronically
- Outcomes
  - Exams graded and returned more efficiently
  - Longer, more comprehensive exams

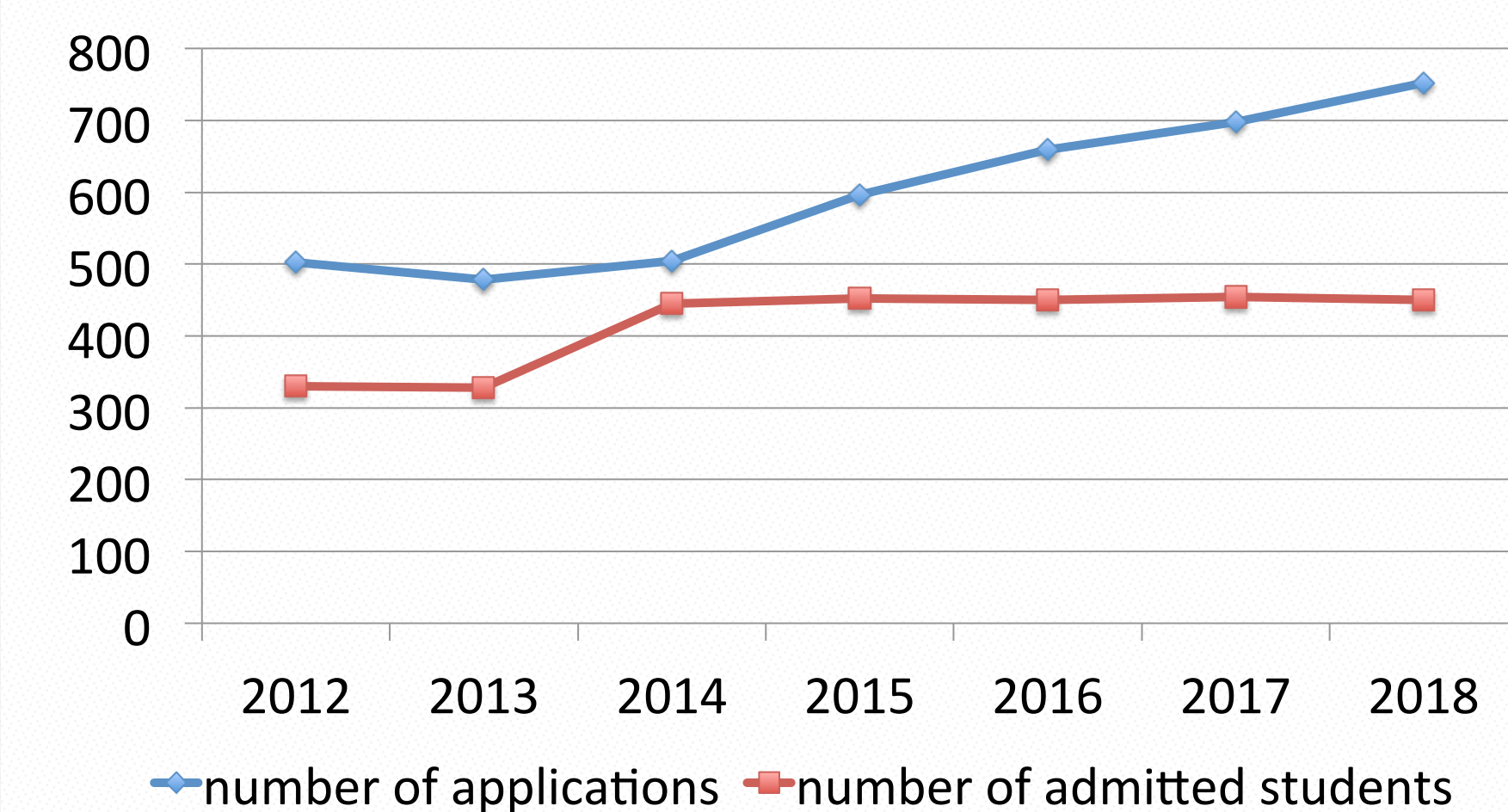


## Year 1 Courses

- Courses offered:
  - Math 1554 Linear Algebra (4 credit)
  - Math 2551 Multivariable Calculus (4 credit)
- Lectures and recitations delivered as live 50-minute sessions, five mornings per week
- Three lectures per week led by faculty, two recitations led by teaching assistants (TAs)
- Lectures and recitations are streamed live to schools
- Students can ask questions during lecture/recitation

## Year 1 Enrollment

number of applications and admitted Year 1 students



DMP enrollment is capped to roughly 450. Nearly every admitted student enrolls in DMP Year 1.

## Other Recent Improvements

- Fall 2018: TurningPoint piloted in lectures
- Fall 2018: further refinements to TA training on blended learning
- Worksheets and TA Guide: offer structure for TAs, teaching strategies

## References

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[2] Mayer, G. (2016). Small Group Work and Whole Group Discussion Mediated Through Web Conferencing Software. *Int. Journ. for Scholarship of Tech. Enhanced Learning*, 1(1).

[3] Mayer, G., Lingle, J., Usselman, M. (2017). Student involvement, satisfaction, and cohesion in synchronous online recitations mediated over web conferencing software. *Educational Technology & Society*, 20(2), 15-26.

[4] Mayer, G., & Sekai, D. (2018). The pedagogical practices of teaching assistants in polysynchronous classrooms: The role of professional autonomy. *InSight: A Journal of Scholarly Teaching*, 13, 130-149.

[5] Abbas, A., Mayer, G. (2018). Supporting teaching assistants in a blended synchronous learning environment. Presented at Joint Math Meetings in San Diego, CA, January 2018.

[6] Smith, M. K., Jones, F. H., Gilbert, S. L., & Wieman, C. E. (2013). The Classroom Observation Protocol for Undergraduate STEM (COPUS): a new instrument to characterize university STEM classroom practices. *CBE-Life Sciences Education*, 12(4), 618-627.

[7] Smith, M. K., Vinson, E. L., Smith, J. A., Lewin, J. D., & Stetzer, M. R. (2014). A campus-wide study of STEM courses: new perspectives on teaching practices and perceptions. *CBE-Life Sciences Education*, 13(4), 624-635.