Application Details

Manage Application: CTL/BP Junior Faculty Teaching Excellence Award - 2018

Award Cycle:	2018
Internal Submission Deadline:	Friday, February 2, 2018

Application Title:	Rabinoff
Application ID:	002123
Nominator's First Name:	Rachel
Nominator's Last Name:	Kuske
Nominator's Title:	Professor and Chair
Nominator's Primary Organization:	School of Math, College of Sciene
Nominator's Email Address:	rachel@math.gatech.edu
Nominator's Phone Number:	4048949238
Nominee's First Name:	Joseph
Nominee's Last Name:	Rabinoff
Nominee's Title:	Assistant Professor
Primary Organization(s):	Mathematics
Nominee's Email Address:	rabinoff@math.gatech.edu

Georgia Institute of Technology

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January 25, 2018

CTL/BP Junior Faculty Teaching Excellence Award
Selection Committee

Dear Award Selection Committee:

I am very happy to nominate our assistant professor, Joe Rabinoff, for the CTL/BP Junior Faculty Teaching Excellence Award. Joe joined the School of Mathematics in August, 2013. He has taught the following undergraduate courses: MATH 1553 (twice), MATH 2602, MATH 4107 (twice), MATH 4108, and MATH 4803.

Since many undergraduate students on campus take such courses, through his teaching Joe has had a broad impact on our undergrads. Illustrations of Joe's teaching excellence and the impact on student learning can be found in his teaching reflection and supporting letters.

Joe's effectiveness and excellence in teaching is documented by the School's DOTE. I am sharing a brief summary below.

Joe taught several undergraduate courses at Georgia Tech. These courses cover mathematics at different levels that is critical to our students in both science and engineering. His average CIOS score as an effective instructor in the undergraduate courses is 4.49/5 at the undergraduate level (468 responses from 547 students), which is very impressive given the range and level of courses that he teaches. Joe uses technology to help students develop intuition on abstract mathematical concepts, and is the driving force behind the development of an interactive, online textbook: http://people.math.gatech.edu/~jrabinoff6/gt-linalg/index.html

Comments and emails from students provide further evidence that Joe deeply cares about his students, has high expectation of his students, and is a very effective and engaging teacher.

Sincerely,

Rachel Kuske

Rachel Kuske
Professor and Chair
School of Mathematics
kuske@math.gatech.edu

Reflective Statement on Teaching

Joseph Rabinoff
School of Mathematics

I will discuss two teaching accomplishments in this statement:

1. I have been heavily involved in the development of the curriculum and course materials for Math 1553, the largest course offered by the School of Mathematics. Among other things, I created a comprehensive set of lecture slides, dozens of interactive demonstrations, and online homework problems, in addition to co-writing a free online textbook for the course. I received very positive feedback from the students, both for the materials and for my instruction; this is reflected in the CIOS scores and comments.
2. I have also had success teaching advanced undergraduate mathematics majors. I led a core group of students through a three-semester sequence of courses, two of which I taught at a level similar to the analogous courses I took at Harvard, and one of which was a topics course that I created for those students. At least five of these students went on to represent Georgia Tech at prestigious PhD programs in mathematics.

Core Mathematics. Math 1553, Introduction to Linear Algebra, is the largest course taught by the School of Mathematics, with approximately 2,000 students each year, almost all engineers in their first or second year. This means that between one half and two thirds of all undergraduates at Tech take Math 1553. It is a relatively new course, a product of the restructuring of the calculus sequence in 2014, and is also one of the first group of classes in the School of Math to have a common final exam. I taught Math 1553 in the fall of 2016 and the fall of 2017.

In a large course such as this, lectures must be carefully and thoughtfully prepared, with crystal-clear learning goals, and delivered in an efficient and engaging manner. At the end of class, I need to be able to say, "Today we talked about two vocabulary words (vector equation, span) one picture (spans of vectors in $\mathbf{R}^2$ and $\mathbf{R}^3$), and one recipe (decide if a vector is in a span)." These concepts all need to be supported by instructive examples and compelling illustrations.

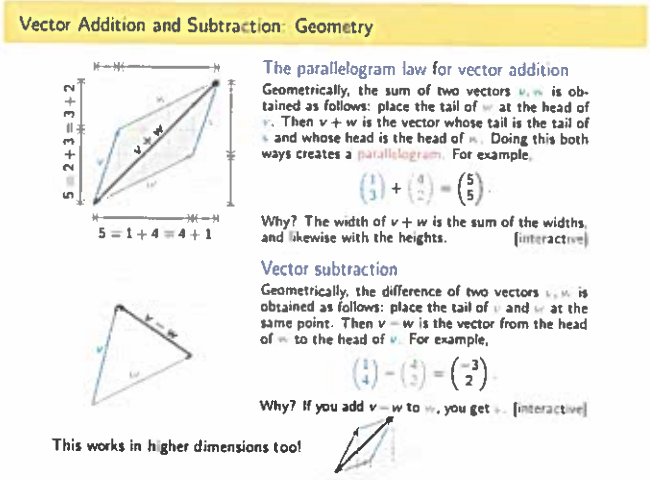
Of course, the quality of in-class instruction is only one of several important components of a successful course. A large selection of supporting materials is also required: a textbook, online homework assignments, in-class and online lecture notes, exams and practice exams, worksheets, quizzes, figures, etc. These all need to be created and curated.

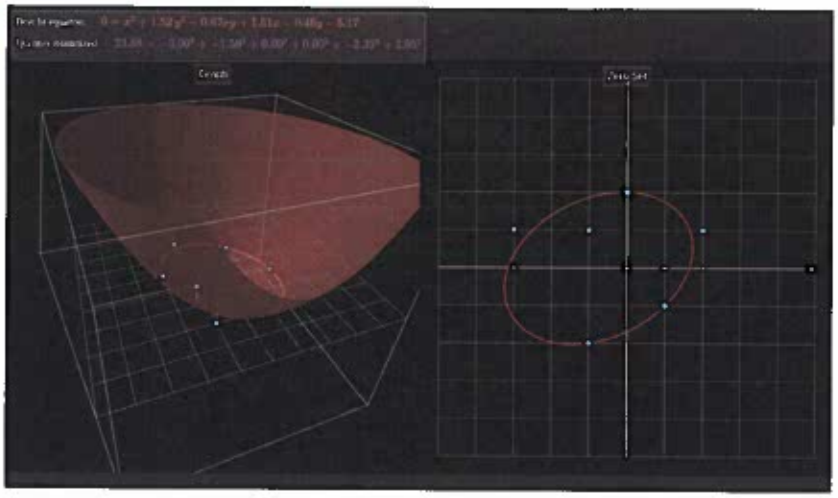
There are as many as ten individual instructors teaching Math 1553 in a given semester, many of whom are postdocs and graduate students. *A robust infrastructure for teaching the class makes it easier for everyone to teach better.* Given that Math 1553 is a new course, the infrastructure was incomplete at best when I started teaching, so I undertook an ambitious program of putting one in place, to address the issues outlined above.

- The first order of business was to create an online resource to make it easy for instructors to access existing course materials. I wrote a flexible and powerful framework for converting a Github repository of materials into an easily-navigable website. Materials are indexed by topic and cross-indexed by type (lecture note, worksheet, etc). In order to populate the materials repository, I organized a "repository jam" during the summer of 2017, in which instructors for several of the core math courses came together for a week to curate and upload the materials that they had created. The goal is to have a full set of ready-to-use materials for all of the core math courses.
- I created a comprehensive set of lecture slides for Math 1553, complete with examples and original figures, and made them available on the course materials repository. Most of the ten instructors in the fall of 2017 used these slides in some way: either modified or unmodified, or as a basis for creating lectures aimed at the right level and with the same learning goals. This is a vital resource for instructors who have never taught the class before—especially incoming postdocs—and helps to make the Math 1553 experience consistent across sections. The slides (and other materials for that semester) can be accessed on my course page:

`http://people.math.gatech.edu/~jrabinoff6/1718F-1553/`

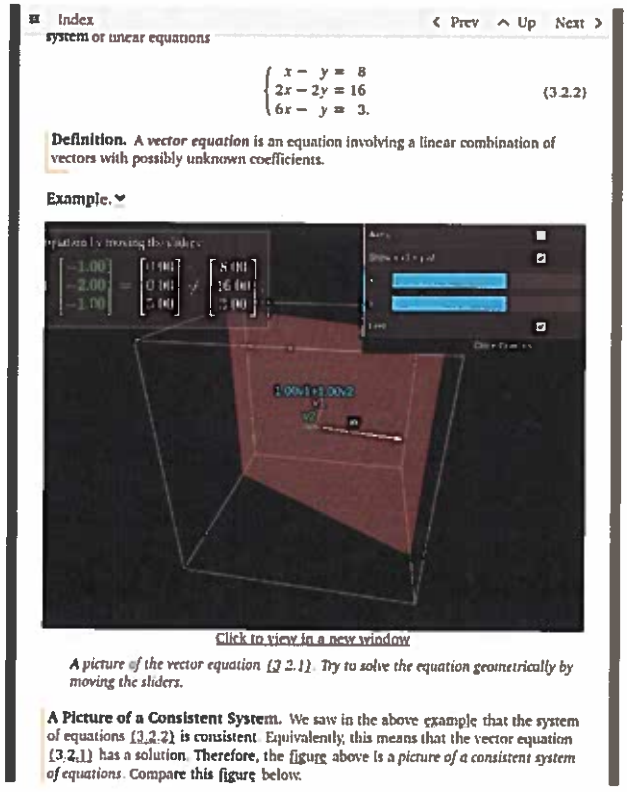
Learning goals are summarized at the end of each lecture, and serve as a study guide for students. See the screenshot below, on the left.





- I created dozens of original interactive demonstrations (available on the course page linked above) to aid the students in gaining a geometric understanding of the material. These demos use recent Web technologies and run in any modern browser. They are highly configurable via URL parameters, and serve equally well as in-class illustrations and as interactive figures for students to study on their own. I even incorporated the demos into worksheets in recitation. I extracted the demos from each lecture and made them available for easy reference on the course page. I am particularly proud of the interactive row reducer (Week 2—this was very popular among students); picture of a consistent linear system (Week 3), solution sets are translates of spans (Week 5), eigenspaces (Week 11), spiraling out and spiraling in (Week 13), and a best-fit parabola and best-fit ellipse (Week 14). A screenshot of the last one is included above, on the right.
- In 2015, Dan Margalit and Greg Mayer created online homework sets using WeBWorK, a free, open-source software package, with the goal of replacing Pearson's proprietary MyMathLab (which has a number of pedagogical issues, in addition to being expensive). With the help of a hired undergraduate, in 2016 I wrote fully-explained solutions to all of the homework problems. This was somewhat challenging, as the questions generally involve randomized numbers. In 2017 I created a number of more open-ended problems that require the students to produce original examples to demonstrate their understanding of the material.

  As of the fall of 2017, all sections of Math 1553 use WeBWorK for online homework.



- Last but certainly not least, I collaborated with Dan Margalit to write an entirely new, free online textbook for Math 1553. It is called *Interactive Linear Algebra*, and can be found here:

  `http://people.math.gatech.edu/~jrabinoff6/gt-linalg/`

  This book has a number of *a priori* advantages over Lay's *Linear Algebra*. It does not cost anything—in fact, it is licensed under the GNU Free Documentation License, which means anyone is allowed to copy, modify, and distribute the book under the same license; it is exclusively targeted at Math 1553, and therefore contains exactly the content of the class, no more, no less; it incorporates about 150 interactive demos as figures embedded in the text; it has clearly-stated learning goals at the beginning of every section, which students can use as a study guide and instructors can use to produce exam questions. I should mention that whereas the exposition is complete, the exercises are still being written. The book will eventually contain applications in the form of vignettes: Georgia Tech professors in engineering

and the sciences will contribute a few paragraphs about how the concepts in that section are relevant to their research. (There are several meetings with professors from other units planned for this semester, of which this is one of the goals.)

The book is available as an additional resource to students in the spring of 2018. We hope to pilot the book as the primary text for the class in the fall of 2018.

Students seemed to find these materials helpful, as evidenced by (a selection of) responses to CIOS questions from 2017:

"I loved WebWork."

"I really enjoyed how well the homework questions prepared me."

"The homework was great at measuring your level of understanding before quizzes and tests."

"The greatest strength was his powerpoint slides for notes".

"Lecture notes were easy to follow—concise, to the point and covered points that matter."

"Dr. Rabinoff's slides were very helpful with the large amount of information that had to be presented in the course. Without them, it would have been almost impossible to keep up."

"The best aspect was that Professor Rabinoff created visual demonstrations to facilitate our understanding."

"Online demonstrations were great!"

"The interactive demonstrations were extremely helpful in understanding the material."

"[Rabinoff] made plenty of notes, animations, and resources available that you could use if you needed help."

Enough about the behind-the-scenes work. I have always been an enthusiastic and engaging lecturer. Energy is infectious, so I try to be as dynamic as possible in the classroom. Students are more engaged when class is interactive, so it is important to make them feel comfortable about asking and answering questions in a large lecture hall. One has to be adept at rephrasing a bad question so that students really believe that all questions are good. I make an effort to be approachable. Students are often less intimidated if I open up a bit about my own life: I regularly use pictures of my son Theo in my slides, and for two years running, he has visited class in person (and in costume) on Halloween to hand out candy.

My favorite part of teaching is the office hours. Georgia Tech students tend to be interesting people, and I enjoy getting to know them: I have met a licensed pilot, an EMT volunteer, and even a professional cage fighter. Last semester, I held four hours of office hours every week (double on exam weeks), which were always very well attended. The atmosphere is casual, with students asking questions and explaining things to each other. I have a computer monitor in the corner for pulling up demos and slides. I learn the names of the dozens of students that speak to me personally.

An important component of teaching a large class is simply making sure things run smoothly. Assignments need to be posted on time; quizzes and exams need to be graded and handed back quickly; and it is critical that recitation section be efficient and productive. Along these lines, I have become much better at managing my squadron of TAs, balancing between giving them the freedom to be creative in recitation while providing enough explicit directions to keep everybody on the same page.

Here is a selection of CIOS scores from 2017 (267 possible respondents):

Question	Score	RR
Course: Amount Learned	4.23	90%
Instructor: Clarity	4.37	90%
Instructor: Respect for students	4.81	90%
Instructor: Enthusiasm	4.91	90%
Instructor: Availability	4.75	90%
Instructor: Overall effectiveness	4.60	90%

Here is a selection of general comments from that CIOS survey:

Course best aspect

"I loved the enthusiasm Rabinoff has for math and his students. It is very clear that he is passionate about what he is teaching and that he wants to help his students."

"The lectures. The professor's lectures are both incredibly engaging as well as thorough."

"The best aspect of the course was the friendliness of Dr. Rabinoff. He learned my name and made me feel welcome to come ask questions."

"Professor Rabinoff is brilliant. I really liked that the course was focused on understanding what linear algebra MEANS and looks like, rather than how to solve problems on it. Amazing visualizations. I've done matrices and 3D geometry before but it was great to put them together."

"Rabinoffice Hours :)"

Instructor greatest strength

"He really cares about his students and wants them to succeed. He really is a caring and dedicated professor and besides the fact that his tests are harder than most teachers, I would recommend him to other students."

"He's very friendly and I felt comfortable going up to Rabinoff and asking the dumbest questions about content. I think it's important for professors to be accessible outside of class, and Rabinoff definitely was."

"Dr. Rabinoff's passion for the material was evident every single day. He was excited about the class which really kept it from being boring. Dr. Rabinoff is also the most accessible of any of my professors. His 'super office hours' are fantastic during exam weeks."

"He is great—he is awesome in office hours and lecture."

"Ability to teach and enthusiasm for the material and teaching as well. Super friendly and easy to talk to professor. Made the class a lot more enjoyable for me personally because having this class at 9 am every Monday, Wednesday, and Friday was like a slap in the face every morning, it really woke me up."

Upper-Level Instruction. In the fall of 2014, I taught Math 4107, Abstract Algebra I, an upper-level undergraduate course (20 students) aimed primarily at math majors. I had been told that the students in the class would not be able to follow Artin's textbook, the one I had learned from, and that instead I should use a book by Herstein. I was pleasantly surprised to find the students were talented and willing to work hard, so I adapted: I supplemented Herstein with extra material, wrote more difficult homework problems, and went into greater depth in lecture.

The course ended up being quite challenging, but rewarding: several of the students were inspired to continue on to take Math 4108, Abstract Algebra II, with me the following semester. I modeled Math 4108 more closely after its counterpart at Harvard, using Artin's text and going quite fast. Having finished the undergraduate algebra sequence, this group of students was eager to learn more. For this reason, in the fall of 2015 I designed and taught Math 4803 (cross-listed as Math 8803), an advanced undergraduate topics course on algebraic number theory. Several students from Emory also participated in the course via two-way videoconferencing.

The workload was heavy—on the CIOS form, students reported spending 6–12 hours per week on the homework—and they learned a lot. By the end of the semester, I was very proud of the facility and fluency they displayed in using advanced techniques and subtle conceptual results to solve both abstract and concrete problems. Five of the 12 students were undergraduates who had taken two semesters of algebra with me already, so it was easy to appreciate the enormous progress they had made. The CIOS scores in these classes were very good; I received a score of 5.0 in overall instructor effectiveness in both 4108 and 4803, with 100% response rate (9/9 and 12/12, respectively).

It was personally rewarding to teach the same set of students over the course of three semesters. It was also quite effective, since we were able to develop a better relationship. At the start of the second semester, there was already a certain amount of trust and loyalty built up on both sides, expectations were already clear, and I had a good idea of how to tailor the course to the individuals enrolled in it. It fostered a sense of community among students who had been classmates in several different classes. The academic community and culture among undergraduates is not to be underestimated, since students learn a lot about how to learn and be successful from their colleagues.

Many of these students are now enrolled in prestigious math PhD programs such as the ones at Berkeley (two students), the University of Pennsylvania, the University of Wisconsin–Madison, and the University of Illinois Urbana-Champaign. I look forward to having them as colleagues in a few years.

The undergraduates at Georgia Tech are a special group of individuals, and I have greatly enjoyed teaching them at all levels.

Georgia Institute of Technology

Igor Belegradek
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January 10th, 2018

Dear Members of the Selection Committee,

I am writing to you as the Director of Teaching Effectiveness to support the nomination of Prof. Joseph Rabinoff to CTL/BP Junior Faculty Teaching Excellence Award.

Since coming to Georgia Tech in 2013 Prof. Rabinoff has taught nearly 600 students (500 students on 1000-2000 level, 55 students on 3000-4000 level, and 43 students above 6000 level).

The bulk of Prof. Rabinoff teaching has been in introductory linear algebra (MATH 1553) which is a core course for engineers taken by thousands Georgia Tech students every year. He also taught both graduate and undergraduate abstract algebra, which are core courses for the Math Major and the Math Ph.D. program. Other courses include discrete and linear mathematics, algebraic geometry, and number theory.

Prof. Matthew Baker, who is Prof. Rabinoff's Faculty Advisor, visited two of his classes, and rated them excellent on all aspects of teaching including presentation and content of lecture, and student-instructor interaction. While I have never observed Prof. Rabinoff in the classroom, I have been to some of his talks, and found him an amazing communicator.

Prof. Rabinoff's CIOS scores are excellent. His scores on effectiveness are 4.49/5 at the undergraduate level (468 responses from 547 students) and 4.69/5 at the graduate level (36 responses from 46 students).

Prof. Rabinoff plays an important role in the school efforts on course coordination. He created an online repository of curated course materials for the core mathematics courses, and has been piloting the use of free, open-source software WeBWorK for online homework assignments, replacing Pearson's MyMathLab. Prof. Rabinoff wrote fully-explained solutions for all of MATH 1553 exercises. He is also co-writing a free online textbook for MATH 1553, and has poured countless hours in designing demos and other course materials, which are now shared with all MATH 1553 instructors.

It is my opinion that Prof. Rabinoff is a phenomenal educator, and I enthusiastically support his nomination.

Sincerely yours,

Igor Belegradek

Professor and Director of Teaching Effectiveness

Georgia Institute of Technology
School of Mathematics
686 Cherry Street
Atlanta GA 30332

Dear Selection Committee,

I am writing to recommend Joseph Rabinoff for the CTL/BP Junior Faculty Teaching Excellence Award. During his time as an Assistant Professor at Georgia Tech, he has taught mathematics classes ranging from undergraduate Linear Algebra (Math 1553) to graduate Algebraic Geometry (Math 6421). He has consistently received great reviews from his students, with an aggregate interpolated median of 4.56 out of 5 in the Overall Effectiveness category.

In the fall of 2017, I had the pleasure of coordinating Math 1553, and Joseph was one of our instructors. Math 1553 is a quintessential core course and is in fact the largest math course at Georgia Tech (over 1300 students last semester), and such a large scale requires careful planning. Joseph was a key contributor to coordination even before the semester began, volunteering his time and effort to help set up the master website for the course and giving feedback on the course material and calendar. He shared his typed comprehensive notes for lectures on our course repository so that all instructors could access them. Many instructors used the notes to guide their lectures, effectively standardizing the lecture material and giving the students a more uniform experience across lectures than we otherwise would have been able to provide. Joseph also created interactive demos to bring the subject to life, and he frequently answered students' questions on the Piazza site shared by all lectures of the course. It quickly became obvious that he was connecting the students with the material and making himself available for help. I once noticed that his office was brimming with students for quite some time before one of our midterm exams, only to discover that he had held four extra office hours to help students review for the exam.

His contributions to teaching at Georgia Tech go far beyond the classroom itself. Joseph spearheaded the creation of the School of Math course repository through GitHub this past spring and has been the main contributor to its infrastructure and content. The repository's interface allows instructors for five different coordinated math courses to share material in a seamless and extremely organized manner, without worrying about the compiling errors that plague file-sharing in the subject. The repository has been a very useful resource since it was launched over the summer. Joseph not only basically designed the framework of the site from the ground up and wrote a detailed FAQ for contributors, but he also organized a session over several days in the summer so that instructors could add their material to the repository with his help. Looking forward, the repository will to continue to grow as it becomes the standard School of Math resource for instructors within coordinated courses.

The curriculum within the School of Math is constantly evolving, and in particular we have been refining our approach towards linear algebra in recent years. In this direction, Joseph has co-written a textbook with Prof. Dan Margalit which will be integrated into our linear

algebra curriculum in the near future. Along with the notes and demos, the textbook will serve as a foundation for how we teach the subject, and it will be free for the students to use. Joseph also helped to write many of the homework problems and solutions for our online Math 1553 homework, which uses the free WeBWorK system. It is fair to say that he has played a major role in helping Georgia Tech develop an independent approach to teaching the most widely-taken mathematics course at the institute.

In brief, my experiences working with Joseph at Georgia Tech have been stellar. He has taken the initiative to bring about changes that required significant work on his part to implement but will pay dividends in the long run. I have no doubt that he will continue to be a great contributor to the School of Math's educational vision, and I highly recommend him for the CTL/BP Junior Faculty Teaching Excellence Award.

Sincerely,

Christopher Jankowski

Christopher Jankowski
Assistant Director of Teaching Effectiveness
Director of Advising and Assessment for the Graduate Program
School of Math
Georgia Institute of Technology

Shashwati da Cunha (Georgia Tech Class of 2021): As a student in Dr. Joe Rabinoff's MATH 1553 class last fall, I'm writing to support his application for the CTL/BP Award. Dr Rabinoff is an extraordinary communicator and a remarkable teacher. He went out of his way to create beautiful visualizations of linear algebra for us. I think one of his goals was to leave us with a visual understanding of a conventionally numeric area of math, and I believe he fully accomplished this. I will think of linear algebra first and foremost in graphical terms solely because of Dr Rabinoff's class. Additionally, he was accessible and answered questions despite having a 200-person lecture. When I went to his office hours, he was happy to teach me much more than the basic math we were covering. We had a fascinating conversation about dimensions of real numbers and infinity that I will always remember.

Following my wonderful experience in Dr Rabinoff's class, I'd like to extend my full support to him for this award.

Breanna Ivey: My name is Breanna Ivey and I am a first year here at Georgia Tech. Last semester I was in Joseph Rabinoff's Linear Algebra class. I struggled in Linear Algebra because of its challenging concepts but Professor Rabinoff did everything in his power to help me succeed. He was always enthusiastic about the material which help boost my moral when trying to learn harder concepts. He always tried new ways to help me understand when I didn't understand the original way concepts were taught.He really made me think about things conceptually and not just mathematically. He was also very accessible to students. He change his office hours whenever it was necessary to accommodate students. His office hours were very useful and beneficial. They were one of the main reasons I was successful in his class. Professor Rabinoff was a great professor and I hope you strongly consider awarding him with the Teaching Excellence Award because he is very deserving.

Kiersten Schutz: I'd like to write to recommend Joseph Rabinoff for the CTL/BP Junior Faculty Teaching Excellence Award.

I had him for MATH 1553 in Fall 2017. I had essentially no prior knowledge of linear algebra, and am not generally fond of math in general (I'm a liberal arts major), but the way he presented the material helped me gain a new appreciation for the beauty of the subject. His interactive models of the concepts were particularly helpful to me, as a visual learner. He was also very friendly, and felt quite approachable. I don't anticipate personally using the material I learned in this class in the future, but I think I'll always have a positive view of linear algebra because of him.

Andrew Galassi: I was in Dr. Rabinoff's Intro to Linear Algebra class (Math 1553) last semester, and wanted to support his candidacy for the Junior Faculty Teaching Excellence Award.

I'm a freshman here at Georgia Tech, and I make no exaggeration when I say Dr. Rabinoff played a key role in making my first semester a great experience. When I called my parents back home, he was my number one example of some of the amazing teaching going on at Tech: between his website demos of linear algebra concepts, fast-paced no-time-wasted teaching style, and sheer enthusiasm for the topic, being in his class was like nothing I had experienced in the classroom before.

Dr. Rabinoff clearly has a great understanding of mathematics and linear algebra, but never struggled in explaining the fundamentals to students that had never been exposed to those topics before. He was relentless in presenting concepts in a multitude of ways whenever possible: with geometric, algebraic, visual, and interactive explanations of tricky concepts, he brute-forced our understanding of concepts that were completely foreign to us.

I told my friends that didn't have the fortune of being in his class how strange it was that he cared so much about the mathematical understanding of freshman, considering his level of mathematical expertise–and they didn't believe me when I said Dr. Rabinoff can make an 8 AM lecture enjoyable. I also made sure to give them links to his class website before the final, so they could all benefit from his helpful interactive web demos–a great resource for all of us.

Hopefully that helps in your decision. Thank you!

Gabrielle Gershon: I think Professor Rabinoff was an excellent teacher this past semester. He truly has a passion for teaching and made himself very accessible throughout the semester. In office hours, Professor Rabinoff would truly help each student understand the material. He could tell if I did not understand the material and then further elaborate using new examples. He also created numerous online demos for his class to help explain to us what was happening geometrically so that it was easier to understand visually. Also, he brought in his son to class on Halloween who was dressed up as a monkey to hand out candy to the class which was awesome. Professor Rabinoff is a great person and an outstanding teacher.

January 5, 2018

Dear Selection Committee,

I very enthusiastically support Dr. Joseph Rabinoff for the CTL/BP Junior Faculty Teaching Excellence Award. In his Introduction to Linear Algebra class, Math 1553, his amazing dedication and passion truly set him apart. As a first-year student in his Monday 8:00 A.M. section, Professor Rabinoff's lecture was the first I ever attended. Initially, the sheer volume of students made it seem as though quality, personalized instruction would be impossible. However, by the end of the semester, he had not only crushed that expectation but set a new standard I will not soon forget.

Professor Rabinoff was extremely committed to providing excellent one-on-one help through whatever means possible, but most significantly in his office hours. They were very often almost completely full, to the point there were sometimes not enough chairs for everyone in attendance. In addition, he would double the amount of time for office hours whenever an important test was upcoming, and even held them when non-essential staff were released due to snow. No matter how basic or repetitive a request was, Dr. Rabinoff would always encourage our questions and give very detailed responses to anything a student asked, without any condescension. He did not care if you were one of his students asking directly about an upcoming final or a student not in his class just trying to gain a deeper understanding, Dr. Rabinoff gave everyone the same attention and assistance. If you came through his door he would either greet you by name or ask what it was, then he would go around and ask everyone if they had questions, which ensured the quietest, shyest people got as much help as the loudest individuals, a balance that is hard to create.

This philosophy carried through into his lectures, where all questions were encouraged. While a professor pausing and asking for questions is fairly common, Dr. Rabinoff took it to the next level. Sometimes, professors have a tendency to dismiss simple questions or unintentionally make students feel uneasy, but he ensured everyone was comfortable raising their hand when they needed clarification. For this reason, a lot of intimidation disappeared. When we completed in-class polls and he asked for volunteers to justify their responses, many people would engage and even when they were wrong or unsure, which is evidence of an environment I do not often see cultured on campus.

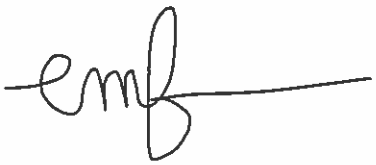
There were many supplements to the course, like the textbook examples and explanations and course reference sheet, but he went above and beyond by creating interactive demos, made available to everyone on his website. He would use this to address students questions in office hours, and included many examples in his lectures. Dr. Rabinoff emphasized the importance of visualization in linear algebra, and he often expressed the sentiment that you don't know a basic

concept if you can't visualize it. The difference between thinking of problems as numbers on a page and understanding problems through visualizing entities in space is significant and Dr. Rabinoff's focus on ensuring his students have a well rounded ability to process linear algebra in both these ways really enhanced my experience and understanding in this course. It would have been so much harder to grasp both these views without all of Dr. Rabinoff's effort into creating, sharing, and modifying his demos, but with these resources at our disposal, a comprehensive understanding of the material was much easier to attain.

There were so many things Dr. Rabinoff did it is easy to overlook some of the small ways he assisted us, but these were very important to our experience in the course. For example, before the final, he released a draft of part of a textbook he was writing along with a fellow professor. It was a work in progress, but because he felt it might help people understand the material, he shared it with everyone. Additionally, one time, I got a confusing result from a tool he created for us, and he responded to my email that he had fixed it less than 24 hours later. In addition to my personal experiences, I have heard from others that when their TA had a last minute emergency and could not make it to recitation, Dr. Rabinoff got there as fast as he could and stayed the whole time to make sure they would not miss any of the material.

Adding these details on to the fact that Dr. Rabinoff carefully crafted demonstrations for every important lesson that both literally and figuratively provided another perspective on the material, it is obvious he consistently went above and beyond his role as an instructor. Some people say to save the best for last, but in my case, I think this first class may be hard to match.

Sincerely,



Emily Fourney

January 6, 2018

To Whom It May Concern:

It is my honor to be able to write a letter of support for Professor Joseph Rabinoff as part of his nomination for the CTL/BP Junior Faculty Teaching Excellence Award. I had the privilege of taking Professor Rabinoff's Math 1553 course this past semester (Fall 2017). First and foremost, Professor Rabinoff has the traits that all great teachers share: passion for the subject and dedication to his students. Beyond these, however, Professor Rabinoff's novel use of technology greatly enhanced my learning process in his course, and I can truthfully say that I believe Professor Rabinoff has the potential to revolutionize education itself.

As a first-year student coming into my first semester at Tech, I had no idea what to expect from Professor Rabinoff's class. My math education up to that point had been fairly standard: textbook readings, lectures, note-taking, lots of homework. Similarly, my experience with technology in education felt ordinary. Occasionally, my teachers would introduce a new app into their classes or try to incorporate some tablets or laptops, but most of the time, technology felt like a gimmick that was at best mildly helpful to the learning process. More often than not, the latest educational tech was unreliable, unhelpful, and generally a waste of precious time and resources.

Because of my background, Professor Rabinoff's class was shocking. From the beginning, it was obvious that Professor Rabinoff loved using technology, and crucially, *he was able to use it effectively*. Take the class website (http://people.math.gatech.edu/~jrabinoff6/1718F-1553/), something more commonly seen in a computer science class than a math class. Class information, lecture slides, worksheets, practice tests, all available with a single click! To be honest, I took this for granted most of the semester until my roommate, who was taking Math 1553 with a different professor, asked me to help him find his professor's resources one day, and I was forced to navigate through scores of T-Square subfolders and links to find information readily accessible on Professor Rabinoff's website. Professor Rabinoff goes above and beyond in investing time in every detail of his classes, and it only made my experience in his class that much better.

Professor Rabinoff's most useful innovation by far was his interactive demos. Math 1553 is a very conceptual class, which I was not prepared for coming from plug-and-chug calculus classes in high school. In fact, the hardest actual "math" in the class is solving cubic polynomials, so most of the difficulty of the class lies in its conceptual aspect. I'm very bad at visualizing mathematical concepts, so I struggled a lot in the class initially with the geometric applications of all the material I was learning. This is where Professor Rabinoff's interactive demos come in. Countless times during the semester I would head back to my dorm after lecture and just play around with the demos, trying to somehow make the concepts make sense in my mind. Eventually, this work paid off, and by the end of the semester the conceptual part of the class was actually a strength rather than a weakness.

Like the actual concepts in Math 1553, I think that to truly understand the power of these interactive demos, you need to see them in action. To that end, I'll be showcasing an interactive

demo (http://people.math.gatech.edu/~jrabinoff6/1718F-1553/demos/eigenspace.html?nomult) for the hardest concept in the class: 3D eigenspaces. Eigenspaces seemed extremely abstract and obtuse to me at first. What are they? What's the point? I probably never would have figured out just staring at lecture notes and pictures. The above demo, however, makes the concept crystal clear. For me, this represents the power of interactive demos: they make a concept hard to understand on paper easier to understand through the medium of graphics.

Although I've spent the bulk of this letter talking about Professor Rabinoff's technological innovations, these innovations are only a reflection of Professor Rabinoff's broader willingness to pursue any avenue possible to help his students learn. In lecture, Professor Rabinoff had an engaging style and patiently answered the many questions my classmates and I asked, yet still was always able to finish covering the day's material. Professor Rabinoff was extremely receptive to students' feedback, constantly tweaking aspects of his class in response. One tweak that helped me was that Professor Rabinoff created more practice problems for quizzes and tests on top of the already generous amount he had already written before the beginning of the semester, greatly improving my studying ability. Finally, Professor Rabinoff sacrificed enormous amounts of his own time on test weeks to hold extra office hours and content review sessions. These sessions became so popular that a large majority of the class would attend, making them seem almost like an extra lecture period.

Finally, I want to touch on Professor Rabinoff's character. Although linear algebra is perhaps not the most exciting of subjects, Professor Rabinoff made the class genuinely enjoyable for me. His passion for teaching and for math was evident in every lecture, and this enthusiasm manifested itself both in his preparation for the lectures and in his genuine desire for us to understand the material. In a large lecture, Professor Rabinoff made an effort to learn the names of everyone who asked a question or showed up to his office hours. I firmly believe that my section of linear algebra far outperformed the other sections on the final exam, just because Professor Rabinoff was that effective as a teacher.

The foundation of a good curriculum is always an amazing professor, and that is what Professor Rabinoff is. When I first started the class, I had no idea how to approach a college math course, but thanks to Professor Rabinoff's efforts, I was able to finish the class with a perfect score. For that reason, I wholeheartedly support Professor Rabinoff's nomination for the CTL/BP Junior Faculty Teaching Excellence Award, in the hopes that his passion and enthusiasm will influence all of Georgia Tech.

Sincerely,

Jesse Jiang

Electrical Engineering

Georgia Institute of Technology

To Whom It May Concern,

My name is Madison Ives, and I am currently a second-year Environmental Engineering major and Georgia Tech. I am delighted to write in support of Dr. Joseph Rabinoff, whose MATH 1553: Introduction to Linear Algebra course I took during the fall semester of 2017. Of the undergraduate mathematics courses that I have taken in the past two years, Dr. Rabinoff course was one of the most challenging and impactful in my education. Not only did Dr. Rabinoff's engaging and interactive methods of teaching help me succeed in the course and respect him as a professor, his endless concern for his students has lead me to respect him greatly as a person.

One of the most unique things about this course was the level of interaction with mathematics, particularly when it came to more theoretical or conceptual material. Because MATH 1553 consists of predominantly freshmen students, many of them, including myself, had not experienced a math course that went so far beyond basic problem-solving. However, Dr. Rabinoff's use of two- and three- dimensional graphing demonstrations and drawings used in lecture helped me understand conceptual material visually and gave students multiple ways of trying to understand concepts. This way, Dr. Rabinoff could offer different ways of thinking about more difficult concepts so each student could find a way that worked for them. In addition, Dr. Rabinoff would write detailed explanations and solutions for all homework questions online, which could help students understand the answers instead of just being given an answer. Combining these with his own "challenge problems," which usually consisted on students creating their own example to fit a set of parameters, I found that I had greater understanding of the conceptual and theoretical material in the course.

In addition to being incredibly knowledgeable about the course material, Dr. Rabinoff has also been the most enthusiastic professor I've ever had at Georgia Tech. He was very passionate about teaching linear algebra and its usefulness in not just future math courses, but in major-specific courses and everyday life. He also encouraged student enthusiasm and engagement when it came to "cool" interactive examples in class, and he constantly checked for students' understanding and invited students to ask questions when they seem unsure or scared to ask. Dr. Rabinoff would make sure to save time during class for people to ask questions, and he would make sure his explanations were clear to everyone before continuing. He showed unending patience and encouragement for students like me who regularly came to office hours because they did not understand the material.

Not only was Dr. Rabinoff incredible at explaining of the course material when students asked for help, he strived to get to know all of his students on a personal level. For example, whenever a new student came to his office hours or asked questions, Dr. Rabinoff would always ask for their name and major, and he would make sure to call that student by their name during office hours when they came again. He showed students that he actually cared about them as people and equals and has been one of the most caring and considerate professors that I have had the privilege of knowing.

Dr. Rabinoff is an excellent candidate for the CTL/BP Junior Faculty Teaching Excellence Award because he has created an interactive learning environment that is helping students prepare for their careers as mathematicians, engineers, and scientists. More importantly, he teaches his students how they can better their approach to learning, and he has provided me with a foundation for success at Georgia Tech and beyond.

Sincerely,
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