# Naneh Apkarian, PhD

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# ACADEMIC POSITIONS

Assistant Professor of Mathematics Education School of Mathematical and Statistical Sciences Arizona State University Tempe, AZ, USA	2020 – Present
Postdoctoral Research Associate Center for Research on Instructional Change in Postsecondary Education	2018 - 2020
Western Michigan University	
Kalamazoo, MI, USA	

# **EDUCATION**

- PhD | Mathematics Education | 2013 2018 University of California San Diego & San Diego State University Dissertation: Transforming Precalculus to Calculus 2: A Longitudinal Study of Social and Structural Change in a University Mathematics Department Advisor: Dr. Chris Rasmussen, San Diego State University
- MA | Mathematics | 2011 2013 University of California San Diego Qualifying exams: Applied Algebra; Complex Analysis
- BA | Mathematics | 2006 2010 Pomona College Thesis: Cutsets on Boolean Lattices Advisor: Dr. Shahriar Shahriari

# PUBLICATIONS

# Journal articles

- Couch, B. A., Prevost, L. B., Stains, M., Whitt, B., Marcy, A. E., Apkarian, N., Dancy, M. H., Henderson, C., Johnson, E., Raker, J. R., <sup>‡</sup>Yik, B. J., Earl, B., Shadle, S., Skvoretz, J., & Ziker, J. P. (2023). Course coordination in introductory undergraduate STEM courses: An underutilized way to promote knowledge sharing and instructional innovation. *Frontiers in Education*, 8:1156781. <u>10.3389/feduc.2023.1156781</u>
- Apkarian, N., Haber, S., <sup>‡</sup>LaTona Tequida, T., & Rasmussen, C. (2023). Prospective secondary teachers' emergent knowledge and neliefs: Inquiry-Oriented Differential Equations contributing to teacher preparation. *ZDM*, 55, 823-835. <u>10.1007/s11858-023-01469-4</u>.
- Dreyfus, T., **Apkarian, N.**, Rasmussen, C., & Tabach, M. (2023). Collective and individual mathematical progress: Layering explanations in the case of Sierpiński triangle. *International Journal of Research in Undergraduate Mathematics Education*. <u>10.1007/s40753-022-00211-x</u>

- <sup>‡</sup>Yik, B. J., Raker, J. R., **Apkarian, N.**, Stains, M., Henderson, C., Dancy, M. H., & Johnson, E. (2022). Association of malleable factors with adoption of research-based instructional strategies in introductory chemistry, mathematics, and physics. *Frontiers in Education*, 7:1016415. <u>10.3389/feduc.2022.1016415</u>
- <sup>‡</sup>Vishnubhotla, M., <sup>‡</sup>Chowdhury, A., **Apkarian, N.**, Johnson, E., Dancy, M., Henderson, C., Lau, A.C., Raker. J. R., & Stains, M., (2022). "I use IBL in this course" may say more about an instructor's beliefs than about their teaching. *International Journal of Research in Undergraduate Mathematics Education*. <u>10.1007/s40753-022-00186-9</u>
- Vroom, K., Gehrtz, J., Apkarian, N., Alzaga Elizondo, T., Ellis, B., & Hagman, J. (2022). Characteristics of interactive classrooms that first year students find helpful. *International Journal of STEM Education*, 9(38). 10.1186/s40594-022-00354-y. Available at <u>https://rdcu.be/cPrPv</u>
- <sup>‡</sup>Creagar, M., Wakefield, N., Smith, W. M., **Apkarian, N.**, Voigt, M. (2022). Developing the Student Instructional Practices Survey in Mathematics for measuring student experiences in introductory mathematics courses. *Investigations in Mathematics Learning*, 14(2), 151-165. <u>10.1080/19477503.2022.2060023</u>
- <sup>‡</sup>Yik, B. J., Raker, J. R., **Apkarian, N.**, Stains, M., Henderson, C., Dancy, M. H., & Johnson, E. (2022). Evaluating the impact of malleable factors on percent time lecturing in gateway chemistry, mathematics, and physics courses. *International Journal of STEM Education* 9, 15. <u>10.1186/s40594-022-00333-3</u>
- Williams, M., Apkarian, N., Uhing, K., Smith, W. M., Martinez, A., & Rasmussen, C. (2021). In the driver's seat: Course coordinators as change agents for active learning in university Precalculus to Calculus 2. International Journal of Research in Undergraduate Mathematics Education. <u>10.1007/s40753-021-00153-w</u>
- Apkarian, N., Henderson, C., Stains, M., Raker, J. R., Johnson, E., & Dancy, M. H. (2021). What really impacts the use of active learning in undergraduate STEM education? Results from a national survey of chemistry, mathematics, and physics instructors. *PLOS ONE* 16(2): e0247544. 10.1371/journal.pone.0247544
- Apkarian, N., & Rasmussen, C. (2021). Instructional leadership structures across five university departments. *Higher Education*, 81(4), 865-887. <u>10.1007/s10734-020-00583-6</u>. Available at <u>https://rdcu.be/b5qY3</u>
- Pilgrim, M. E., **Apkarian**, **N.**, Milbourne, H., & O'Sullivan, M. (2021). From rough waters to calm seas: The challenges and successes of building a GTA PD program. *PRIMUS*, *31*(3-5), 594-607. <u>10.1080/10511970.2020.1793851</u>
- Goodchild, S., Apkarian, N., Rasmussen, C., & Katz, B. (2021). Critical stance within a community of inquiry in an advanced mathematics course for pre-service teachers. *Journal of Mathematics Teacher Education*, 24, 231-252. 10.1007/s10857-020-09456-2. Available at https://rdcu.be/b22nd
- **Apkarian, N.**, Kirin, D., Gehrtz, J., & Vroom, K. (2021). Connecting the stakeholders: Departments, policy, and research in undergraduate mathematics education. *PRIMUS*, *31*(1), 17-36. <u>10.1080/10511970.2019.1629135</u>
- Tabach, M., Rasmussen, C., Dreyfus, T., & Apkarian, N. (2020). Towards an argumentative grammar for networking: A case of coordinating two approaches. *Educational Studies in Mathematics*, 103(2), 139-155. <u>10.1007/s10649-020-09934-7</u>. Available at <u>https://rdcu.be/b1g44</u>
- Rasmussen, C., **Apkarian, N.**, Tabach, M., & Dreyfus, T. (2020). Ways in which engaging in someone else's reasoning is productive. *Journal of Mathematical Behavior*, *58*, 100742.
- Reinholz, D. L., Matz, R. M., Cole, R., & Apkarian, N., (2019). STEM is not a monolith: A preliminary analysis of variations in STEM disciplinary cultures and implications for change. CBE—Life Sciences Education, 18(4). 10.1187/cbe.19-02-0038

- Voigt, M., Apkarian, N., Rasmussen, C., & Progress through Calculus Team. (2019). Undergraduate course variations in Precalculus through Calculus 2. International Journal of Mathematical Education in Science and Technology. <u>10.1080/0020739X.2019.1636148</u>
- **Apkarian, N.**, Tabach, M., Dreyfus, T., & Rasmussen, C. (2019). The Sierpinski smoothie: Blending area and perimeter. *Educational Studies in Mathematics*, *101*(1), 19-34. <u>10.1007/s10649-019-09889-4</u>. Available at <u>https://rdcu.be/bqXod</u>
- Reinholz, D. L., Bradfield, K., & Apkarian, N. (2019). Using analytics to support instructor reflection on student participation in a discourse-focused undergraduate mathematics classroom. *International Journal of Research in Undergraduate Mathematics Education*, 5(1), 56-74. <u>10.1007/s40753-019-</u> <u>00084-7</u>
- Rasmussen, C., Apkarian, N., Hagman, J. E., Johnson, E., Larsen, S., Bressoud, D., & Progress through Calculus team. (2019). Characteristics of Precalculus through Calculus 2 programs: Insights from a national census survey. *Journal of Research in Mathematics Education*, 50(1), 98-112. <u>10.5951/jresematheduc.50.1.0098</u>
- Apkarian, N., Bowers, J., O'Sullivan, M. E., & Rasmussen, C. (2018). A case study of change in the teaching and learning of Precalculus to Calculus 2: What we're doing with what we have. *PRIMUS*, 28(6), 528-549. 10.1080/10511970.2017.1388319
- Reinholz, D. L., & **Apkarian**, **N.** (2018). Four frames for systemic change in STEM departments. International Journal of STEM Education, 5(3), 1-10. <u>10.1186/s40594-018-0103-x</u>
- Dinsdale, E.A., Edwards, R.A., Bailey, B.A., Tuba, I., Akhter, S., McNair, K., Schmieder R., Apkarian, N., Creek, M., Guan, E., Hernandez, M., Isaacs, K., Peterson, C., Regh, T., & Ponomarenko, V. (2013) Multivariate analysis of functional metagenomes. *Frontiers: Genetics*, 4(41). <u>10.3389/fgene.2013.00041</u> [Based on REU Project]

# Preprints & Articles in Review

- Lau, A. C., Henderson, C., Stains, M., Dancy, M., Merino, C., Apkarian, N., Raker, J. R., & Johnson, E. (in review). Characteristics of departments with high-use of active learning in introductory courses: Implications for departmental transformation. IJ STEM Education.
- Dancy, M., Henderson, C., **Apkarian, N.**, Johnson, E., Stains, M., Raker, J. R., & Lau, A. C. (in review). Physics instructors' knowledge and use of active learning has increased over the last decade – but most still lecture too much. Pre-print available: <u>https://arxiv.org/abs/2211.13082</u>

# Refereed conference proceedings

- Apkarian, N., Johnson, E., Henderson, C., Dancy, M. H., & Lau, A. C. (accepted). How do instructors understand unequal representation in STEM? In S. Cook, B. Katz, & D. Moore-Russo (Eds.), *Proceedings of the 25<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education*, 35-44. Omaha, NE.
- <sup>‡</sup>Guglielmo, J., <sup>‡</sup>Phelps, J., <sup>‡</sup>Yu, F., <sup>‡</sup>Heyer, N., & **Apkarian, N.** (accepted). What is a "math person?": Students' interpretation of identity terminology. In S. Cook, B. Katz, & D. Moore-Russo (Eds.), *Proceedings of the 25<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education*, 661-668. Omaha, NE.
- Apkarian, N., Johnson, E., <sup>‡</sup>Guglielmo, J., <sup>‡</sup>Park, M., & <sup>‡</sup>Ruiz, S. (2022). How 2020 (didn't) change calculus instructors' DEI engagement. In S. S. Karunakaran & A. Higgins (Eds.), *Proceedings of the 24th Annual Conference on Research in Undergraduate Mathematics Education*, 914-920. Boston, MA.
- Johnson, E., **Apkarian, N.**, Henderson, C., Dancy, M. H., & Lau, A. (2022). Undergraduate math and science instructor's attitudes, beliefs, and views on diversity, inclusion, and equity. In S. S.

Karunakaran & A. Higgins (Eds.), Proceedings of the 24th Annual Conference on Research in Undergraduate Mathematics Education, 278-286. Boston, MA.

- <sup>‡</sup>Vishnubhotla, M., <sup>‡</sup>Chowdhury, A., **Apkarian, N.**, & Johnson, E. (2021). Implementation of IBL in undergraduate calculus classes. In S. S. Karunakaran & A. Higgins (Eds.), 2021 Research in Undergraduate Mathematics Education Reports, 369-367. [Conference canceled due to COVID-19; papers were still peer-refereed for inclusion in proceedings].
- Apkarian, N., Johnson, E., Raker, J. R., Stains, M., Henderson, C., Dancy, M. H. (2020). Assessing the uptake of research based instructional strategies by postsecondary mathematics instructors. In S. S. Karunakaran, Z. Reed., & A. Higgins (Eds.), *Proceedings of the 23rd Annual Conference on Research in Undergraduate Mathematics Education*, 18-27. Boston, MA.
- Alzaga Elizondo, T., Ellis, B., Apkarian, N., Sánchez Robayo, B., Robbins, C. K., & Johnson, E. (2020). Departmental change in reaction to the threat of losing calculus: Three cases. In S. S. Karunakaran, Z. Reed., & A. Higgins (Eds.), Proceedings of the 23rd Annual Conference on Research in Undergraduate Mathematics Education, 151-158. Boston, MA.
- Williams, M., Apkarian, N., Uhing, K., Funk, R., Smith, W. M., Wakefield, N., Martinez, A., & Rasmussen, C. (2020). In the driver's seat: Course coordinators as change agents for active learning in university Precalculus to Calculus 2. In S. S. Karunakaran, Z. Reed., & A. Higgins (Eds.), *Proceedings of the 23rd Annual Conference on Research in Undergraduate Mathematics Education*, 637-645. Boston, MA.
- **Apkarian, N.**, & Reinholz, D. L. (2019). Understanding and enacting organizational change: An approach in four frames. In A. Weinberg, D. Moore-Russo, H. Soto, & M. Wawro (Eds.), *Proceedings of the 22<sup>nd</sup> Annual Conference on Research in Undergraduate Mathematics Education*, 10-17. Oklahoma City, OK.
- Vroom, K., Gehrtz, J., Alzaga Elizondo, T., Ellis, B., **Apkarian, N.**, & Hagman, J. E. (2019). First-year mathematics students' view of helpful teaching practices. In A. Weinberg, D. Moore-Russo, H. Soto, & M. Wawro (Eds.), *Proceedings of the 22<sup>nd</sup> Annual Conference on Research in Undergraduate Mathematics Education*, 1055-1060. Oklahoma City, OK.
- Apkarian, N., Kirin, D., & Voigt, M. (2019). Course coordination patterns in university precalculus and calculus courses. In A. Weinberg, D. Moore-Russo, H. Soto, & M. Wawro (Eds.), Proceedings of the 22<sup>nd</sup> Annual Conference on Research in Undergraduate Mathematics Education, 834-839. Oklahoma City, OK.
- Apkarian, N., Rasmussen, C., Tabach, M., & Dreyfus, T. (2018). Conceptual blending: The case of the Sierpinski Triangle area and perimeter. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, & S. Brown (Eds.) Proceedings of the 21<sup>st</sup> Annual Conference on Research in Undergraduate Mathematics Education, 169-184 (long paper); 541-548 (short paper). San Diego, CA.
- Apkarian, N. (2018). Emerging instructional leadership in a new course coordinator system. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, & S. Brown (Eds.) Proceedings of the 21<sup>st</sup> Annual Conference on Research in Undergraduate Mathematics Education, 1414-1419. San Diego, CA.
- Dreyfus, T., Rasmussen, C., Apkarian, N., & Tabach, M. The complexity of knowledge construction in a classroom setting. *INDRUM 2018*: INDRUM Network, University of Agder, Kristiansand, Norway. <u>hal-01849971</u>
- Apkarian, N., Rasmussen, C. (2017). Mathematics instruction leadership in undergraduate departments. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, & S. Brown (Eds.) Proceedings of the 20<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education, 485-493. San Diego, CA.
- Quardokus Fisher, K., **Apkarian, N.**, & Walter, E. (2017). Let's talk about teaching: Investigating instructors' social networks. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, & S. Brown (Eds.)

Proceedings of the 20<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education, 1214-1218. San Diego, CA.

- Voigt, M., Rasmussen, C., & Apkarian, N. (2017). Variations in Precalculus through Calculus 2 courses. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, & S. Brown (Eds.) Proceedings of the 20<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education, 1001-1008. San Diego, CA.
- Kirin, D., Vroom, K., Larsen, S., & Apkarian, N. (2017). Instruction in precalculus and single-variable calculus in the United States: A bird's eye view. In A. Weinberg, C. Rasmussen, J. Rabin, M. Wawro, & S. Brown (Eds.) Proceedings of the 20<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education, 1267-1272. San Diego, CA.
- Rasmussen, C., Apkarian, N., Dreyfus, T., & Voigt, M. (2016). Ways in which engaging in someone else's reasoning is productive. In E. Nardi, C. Winsløw, & T. Hausberger (Eds.), Proceedings from INDRUM 2016: First conference of the International Network for Didactic Research in University Mathematics, 504-513. University of Montpellier & INDRUM: Montpellier, France.
- Apkarian, N. (2016). Talking about teaching: Social networks of instructors of undergraduate mathematics. In T. Fukawa-Connelly, N. Infante, M. Wawro, & S. Brown (Eds.), Proceedings of the 19<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education, 515-518. Pittsburgh, PA.
- Apkarian, N., Rasmussen, C., Dreyfus, T., Voigt, M., Milbourne, H., & Gao, X. (2016). Ways in which engaging in someone else's reasoning is productive. In T. Fukawa-Connelly, N. Infante, M. Wawro, & S. Brown (Eds.), Proceedings of the 19<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education, 518-526. Pittsburgh, PA.
- Apkarian, N., & Kirin, D. (2016). Active learning in undergraduate precalculus and single variable calculus. In T. Fukawa-Connelly, N. Infante, M. Wawro, & S. Brown (Eds.), Proceedings of the 19<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education, 512-514. Pittsburgh, PA.
- Rasmussen, C., Apkarian, N., Bressoud, D., Ellis, J., Johnson, E., & Larsen, S. (2016). A national investigation of precalculus through calculus 2. In T. Fukawa-Connelly, N. Infante, M. Wawro, & S. Brown (Eds.), Proceedings of the 19<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education, 1245-1251. Pittsburgh, PA.
- Apkarian, N. (2015). Social networks among communities of undergraduate mathematics instructors at PhD granting institutions. In T. Fukawa-Connelly, N. E. Infante, K. Keene, & M. Zandieh (Eds.), Proceedings of the 18<sup>th</sup> Annual Conference on Research in Undergraduate Mathematics Education, 369-373. Pittsburgh, PA.

# Technical reports and white papers

- <sup>‡</sup>Street, C., Apkarian, N., Gehrtz, J., <sup>‡</sup>Tremaine, R., <sup>‡</sup>Barron, V., Voigt, M., & Hagman, J. E. (2021). X-PIPS-M Data Summary. <u>arXiv:2111.01795</u>
- Apkarian, N., Smith, W., Vroom, K., Voigt, M., Gehrtz, J., PtC Project Team, & SEMINAL Project Team. (2019). *X-PIPS-M Survey Suite*. Available: <u>http://bit.ly/2wwcSok</u>
- **Apkarian, N.**, Bonds, M.D., Quardokus Fisher, K., & Burt, B. (2019). *Guide to Inclusion Awareness in the Organization of Knowledge*. Available: <u>http://bit.ly/33WhzHF</u>
- **Apkarian, N.**, Kirin, D., & Progress through Calculus Team. (2017). *Progress through calculus: Census survey technical report*. Mathematical Association of America. Available: <u>http://bit.ly/2xcbZTV</u>

## Chapters in edited books

- Apkarian, N. & Larsen, S. (2022). Program assessment & using local data. In E. Johnson, N. Apkarian, K. Vroom, A. E. Martinez, C. Rasmussen, & D. Bressoud, (Eds)., Addressing Challenges to the Precalculus to Calculus II Sequence through Case Studies (pp. 55-64). MAA Press.
- <sup>‡</sup>Sánchez Robayo, B. J., **Apkarian, N.**, Johnson, E., <sup>‡</sup>Alzaga Elizondo, T., <sup>‡</sup>Ellis, B., & Robbins, C. (2022). Institutional and departmental change: Responding to crisis. In E. Johnson, **N. Apkarian**, K. Vroom, A. Martinez, C. Rasmussen, & D. Bressoud, (Eds)., *Addressing Challenges to the Precalculus to Calculus II Sequence through Case Studies* (pp. 65-74). MAA Press.
- Apkarian, N. (accepted). A critical examination of undergraduate degree completion: Problematizing institutional diversity measures in STEM. In M. Voigt, J. E. Hagman, J. Gehrtz, N. Alexander, B. Ratliff, & R. Levy (Eds.), Justice through the lens of calculus. MAA Press.
- Rasmussen, C., Apkarian, N., Donsig, A., Martinez, A., Tubbs, R., & Williams, M. (2021). Designing and implementing course coordination. In W. M. Smith, M. Voigt, A. Ström, D. Webb, & G. Martin (Eds.), SEMINAL Student Engagement in Mathematics through an Institutional Network for Active Learning: Cases of Successful Departments (pp. 154-167).
- Quardokus Fisher, K., & Apkarian, N. (2018). Instructor networks across 22 STEM departments. In C. Henderson, C. Rasmussen, A. Knaub, N. Apkarian, A. J. Daly, & K. Quardokus Fisher (Eds.), Researching and Enacting Change in Postsecondary Education: Leveraging Instructors' Social Networks (pp. 96-125). Routledge.

## Edited volumes

- Johnson, E., **Apkarian, N.**, Vroom, K., Martinez, A., Rasmussen, C., & Bressoud, D. (Eds.) (2022). Addressing Challenges to the Precalculus to Calculus II Sequence through Case Studies. MAA Press.
- Henderson, C., Rasmussen, C., Knaub, A., Apkarian, N., Daly, A.J., & Quardokus Fisher, K. (Eds.)., (2018). Researching and Enacting Change in Postsecondary Education: Leveraging Instructors' Social Networks. Routledge: New York, NY.

#### Communication

- White, K. & Apkarian, N. (2020, June 9). Start somewhere: Resources on equity and inclusion for STEM and higher education. [Blog post]. Retrieved from: <u>ascnhighered.org/ASCN/posts/dei\_resources.html</u>
- Apkarian, N., Kirin, D., Gehrtz, J., & Vroom, K. (2019, August 15). Connecting departments, policies, and RUME. [Blog post]. Retrieved from: <u>https://www.mathvalues.org/masterblog/connectingdepartments</u>
- **Apkarian, N.** (2019, June 13). Evaluating the educational experience in post-secondary mathematics: A new survey suite. [Blog post]. Retrieved from: <u>https://www.mathvalues.org/masterblog/launchings201906-apkarian</u>
- Apkarian, N., Bonds, M.D., Quardokus Fisher, K., & Burt, B. (2019, May 29). Inclusive Approaches to Reviewing Scholarship: A New Guide. [Blog post]. Retrieved from: <u>https://ascnhighered.org/ASCN/posts/inclusion\_guide.html</u>
- **Apkarian, N.**, Kirin, D., Gehrtz, J., & Vroom, K. (2017). Math department concerns: Working to bridge the gap between goals and first steps. *MAA FOCUS, February/March*, 35-37.
- Voigt, M., **Apkarian**, N., & Rasmussen, C. (2017). Diverging from the standard fare: Variations in the calculus curriculum. *MAA FOCUS*, *February/March*, 32-34.

#### Manuscripts in preparation

- Apkarian, N., Johnson, E., Lau, A. C., Dancy, M., & Henderson, C. Faculty views of diversity, equity, and inclusion in STEM.
- **Apkarian, N.**, Voigt, M., <sup>‡</sup>Street, C., <sup>‡</sup>Tremaine, R., Martinez, A., <sup>‡</sup>Guglielmo, J., & Hagman, J. E. Modeling the impact of instructional practices on students' math affect across race-gender groups.

<sup>‡</sup>Graduate student or postdoc co-author.

# **RESEARCH FUNDING**

#### Pending

*Collaborative Research: Assessing Collegiate Mathematics for Equity in Partnership with Estudiantes.* National Science Foundation: \$236,986. (Submitted Oct 2023). Principal Investigator.

*Finding Academic Filters: Intersectional Analysis of Trends in Recruitment and Retention of Scientists and Engineers in Academia.* Spencer Foundation: \$63,970. (Revised submission June 2023). Principal Investigator.

Collaborative Research: HSI Implementation and Evaluation Project: Linking Institutional Culture, Faculty, and Latine Student Success. National Science Foundation: \$353,801. (Submitted Aug 2023). Principal Investigator.

HSI Institutional Transformation Project: Development, Implementation, and Evaluation of an Introductory Mathematics and Data Science Course for Prospective STEM Majors in Arizona. National Science Foundation: \$3,000,000. (Submitted Aug 2023). Co-Principal Investigator.

IUSE: Collaborative Research: Researching institutional transformation in the context of interdisciplinary STEM partnerships to support student transfer of mathematical knowledge. National Science Foundation: \$50,240. (Submitted July 2023). Principal Investigator.

# Not awarded

*Finding Academic Filters: Intersectional Analysis of Trends in Recruitment and Retention of Scientists and Engineers in Academia.* Spencer Foundation: \$47,656. [< 10% proposals funded].

NSF INCLUDES: Developing Resources, Equity, Aptitudes and Mentoring for Mathematics through Curricular and Experiential Learning and a Pipeline Network from Community Colleges, Universities to Doctoral Institutions (DREAM-Math). National Science Foundation: \$800,000.

*Collaborative Research: Racial Equity: Measuring and Assessing Collegiate Mathematics for Equity in Partnership with Estudiantes.* National Science Foundation: \$701,544.

# ADDITIONAL SCHOLARLY ACTIVITIES

# Invited presentations / panels

**Apkarian, N.** (2023). Patterns and nuance in chemistry, mathematics, and physics instructors' views of DEI issues and initiatives. DBER Seminar. North Dakota State University.

- **Apkarian, N.** (2023). Active learning in undergraduate mathematics: Beyond the basics. Indiana University Purdue University Indianapolis.
- **Apkarian, N.** (2023). Special session on *Fostering Systemic Change: New and Critical Lenses for Curricula and Programs*. Undergraduate Biology Education Research (UBER) Gordon Research Conference (GRC) and Gordon Research Seminar (GSR). Bates College: Lewiston, ME.
- **Apkarian, N.** & Rasmussen, C. (2023). Active learning in undergraduate mathematics: Beyond the basics. Cornell University Mathematics Department. April 13, 2023. [Remote Presentation]
- Apkarian, N. (2023). Changing leaders leading change. Special session on Lessons Learned from Successful Departmental Efforts to Transform Precalculus and Calculus at The Joint Mathematics Meetings 2023. Boston, MA. [Canceled due to scheduling conflict].
- **Apkarian, N.** (2022). An intersectional look at how instructional practices impact math affect. *Natural Sciences Inclusion Summit 2022*. Arizona State University RISE Center.
- **Apkarian, N.** (2021). Culture, change, and instruction in postsecondary mathematics. Invited keynote for research session of *AMATYC Annual Conference*.
- Rasmussen, C., & Apkarian, N. (2021). Research on Learning and Teaching University Mathematics: Where we are and where we might go next. *Oliver Club Seminar*, Cornell University Mathematics Department. Mar 25, 2021. [Remote presentation]
- **Apkarian, N.** (2021). Social network analysis and communities in mathematics education. *Colloquium*, CSU Long Beach. Mar 19, 2021. [Remote presentation]
- **Apkarian, N.** (2021). Social network analysis and communities in mathematics education. *Colloquium*, Clemson University. Feb 12, 2021. [Remote presentation]
- **Apkarian, N.** (2020). Departmental change. *PCRG Research Webinar*, Rutgers University Proof Comprehension Research Group. December 4, 2020. [Remote presentation]
- Apkarian, N. (2020). Social network analysis & communities in mathematics education. *Mathematics Education Seminar*, Texas State University Department of Mathematics. October 9, 2020. Presented Virtually. San Marcos, TX. [Remote presentation].
- **Apkarian, N.**, Uscanga, R., Rahman, Z., & Mesa, V. (2020). Speaking *with* not speaking *for*: Thoughtful allyship among womxn in RUME. Panel session presented at *Mentoring and Partnerships for Womxn in RUME (MPWR) 2020*. Boston, MA.
- **Apkarian, N.** (2020). Assessing the Uptake of RBIS by Postsecondary Calculus Instructors. *EMST-RWI* Work-in-Progress Colloquium. University of Michigan. Ann Arbor, MI.
- **Apkarian, N.** (2019). Understanding and Improving Undergraduate STEM: Social & Structural Strategies. *Florida International University, Colloquium.* Miami, FL.
- **Apkarian, N.** (2019). Invited participant at *Workshop on Scaling-Up and Sustaining Efforts to Improve Student Success in General Chemistry*. American Chemical Society & Association of Public & Land-Grant Universities. Washington, D. C.
- Apkarian, N. (2019). Keynote speaker at UTK CoMInDS Workshop. Sponsored by UTK College of Arts & Sciences, UTK Department of Mathematics, and UTK Office of Research and Engagement. Knoxville, TN.
- Apkarian, N., Hagman, J. E., Rasmussen, C., Bressoud, D., Johnson, E., Larsen, S., Gehrtz, J., Vroom, K., & Voigt, M. (2019). The Progress through Calculus project: A national study of precalculus through calculus 2 programs. Special session on NSF DUE Projects at The Joint Mathematics Meetings 2019. Baltimore, MD.

- **Apkarian, N.**, & Rasmussen, C. (2018). Mathematics instruction leadership in undergraduate departments. Special session on *Research in Undergraduate Mathematics Education* at *The Joint Mathematics Meetings 2018*. San Diego, CA.
- **Apkarian, N.**, & McConnell, M. (2017). Social network analysis in DBER and RUME: A new(ish) approach. Targeted session at the *Transforming Research in Undergraduate STEM Education* (*TRUSE 2017*) conference. St. Paul, MN.
- **Apkarian, N.** (2017). Arguing about Sierpinski's Triangle. *California State University, Channel Islands Graduate Student Colloquium*. Camarillo, CA.

## Awards

- 2019 Participant, *Future Faculty Development Program*. Virginia Tech Office for Inclusion and Diversity. One of 43 selected from 446 applicants. <u>www.inclusive.vt.edu/Programs/future\_faculty.html</u>
- 2017-18 ARCS Scholar, San Diego Chapter. Achievement Rewards for College Scientists: Advancing Science in America.

## Additional posters and presentations

- <sup>‡</sup>Ruiz, S. & **Apkarian, N.** (2022). Meritocrats, wallflowers, and more: Characterizing obstacles to DEI engagement. Presentation in RUME session at MAA Mathfest. Philadelphia, PA.
- <sup>‡</sup>Vishnubhotla, M., <sup>‡</sup>Chowdhury, A., **Apkarian, N.**, & Johnson, E. (2022). Impact of calculus coordination on instructional practices: A Preliminary Investigation. In S. S. Karunakaran & A. Higgins (Eds.), *Proceedings of the 24th Annual Conference on Research in Undergraduate Mathematics Education*, 1189. Boston, MA.
- <sup>‡</sup>LaTona-Tequida, T., Rasmussen, C., <sup>‡</sup>Ralston, K., & **Apkarian, N.** (2022). An analysis of eleven department change initiatives. In S. S. Karunakaran & A. Higgins (Eds.), *Proceedings of the 24th Annual Conference on Research in Undergraduate Mathematics Education*, 1239. Boston, MA.
- Rasmussen, C., <sup>‡</sup>LaTona-Tequida, T., **Apkarian, N.**, & Habre, S. (2021). Re-encountering rate of change in differential equations. Poster presentation at PMENA-43. Philadelphia, PA.
- **Apkarian, N.,** <sup>‡</sup>Alzaga Elizondo, T., <sup>‡</sup>Ellis, B., <sup>‡</sup>Sánchez Robayo, B., Robbins, C. K., & Johnson, E. (2020). Departmental Change in Reaction to the Threat of Losing Calculus: Three Cases. Presentation in *Contributed Paper Session: Re-envisioning the Calculus Sequence* of the *Joint Mathematics Meetings 2020*. Denver, CO.
- **Apkarian, N.**, Johnson, E., Stains, M., Raker, J. R., Dancy, M. H., Henderson, C. (2019). Awareness and Use of Research-Based Instructional Strategies in STEM. Poster presentation at *AAC&U PKAL Transforming STEM Higher Education Conference*. Chicago, IL.
- Dancy, M., Apkarian, N., Henderson, C., Raker, J., Johnson, E., & Stains, M. (2019). Survey of physics, mathematics, and chemistry faculty. *AAPT Summer Meeting 2019*. American Association of Physics Teachers: College Park, MD.
- **Apkarian, N.** (2019). Understanding and enacting math department change: An approach in four frames. Poster presentation at *ASCN Transforming Institutions Conference 2019*. Accelerating Systemic Change Network: Pittsburgh, PA.
- Rasmussen, C., Hagman, J., & Apkarian, N. (2019). Theorizing coordination and the role of course coordinators. Poster presentation at *Eleventh Congress of the European Society for Research in Mathematics Education*, Thematic Working Group 14: University Mathematics Education.
- Kerrigan, S., **Apkarian, N.**, & Johnson, E. (2019). Overview of Evaluating the Uptake of Research-Based Instructional Strategies in Undergraduate Chemistry, Mathematics, and Physics. In A. Weinberg, D.

Moore-Russo, H. Soto, & M. Wawro (Eds.), *Proceedings of the 22<sup>nd</sup> Annual Conference on Research in Undergraduate Mathematics Education*, 1130. Oklahoma City, OK. [Poster]

- Vroom, K. Apkarian, N., Gehrtz, J., Hagman, J. E., Voigt, M., Martinez, A. (2019). Students' reports of precalculus and calculus course experiences. *The Joint Mathematics Meetings 2019*. Baltimore, MD.
- O'Sullivan, M. E., **Apkarian, N.**, Reinholz, D., & Zahner, W. (2018). Transforming introductory STEM courses: Moving beyond instructional improvements. Workshop at *The 2018 Southern California* (SoCal) PKAL Regional Network Meeting. University of California, Los Angeles.
- **Apkarian, N.**, Kirin, D., & Vroom, K. (2017). Active learning usage in Precalculus to Calculus 2. *The Joint Mathematics Meetings 2017*: Atlanta, GA.
- **Apkarian, N.,** Rasmussen, C., Milbourne, H., & Dreyfus, T. (2016). Ways in which engaging in someone else's reasoning is productive. *Interactive paper session at NCTM Research Conference 2016.*
- **Apkarian, N.** (2016). Talking about teaching: Social networks of instructors of undergraduate mathematics. XXVI International Sunbelt Social Network Conference: Presentation and poster abstracts, 9-10.

<sup>‡</sup>Graduate student or postdoc co-author.

## MENTORING

#### Doctoral student supervision

- Kayla Lock, PhD in Mathematics Education (2023). An Investigation into the Relationships Among Teachers' Mathematical Meanings for Teaching, Commitment to Quantitative Reasoning, and Decentering Actions. (co-Chair: Dr. Marilyn Carlson)
- Jason Guglielmo, PhD in Mathematics Education (co-Chair: Dr. Dov Zazkis).
- Nicholas Heyer, PhD in Mathematics Education.

## **Doctoral committees**

#### Arizona State University

Abby Rocha, PhD in Mathematics Education (2023) Inyoung Lee, PhD in Mathematics Education (exp. 2024) Jeremy Bernier, PhD in Learning, Literacies, and Technologies (exp. 2024) Jazmine Perez Turner, PhD in Mathematics Education Fern Van Vliet, PhD in Mathematics Education Ishtesa Khan, PhD in Mathematics Education Katherine (Kaki) Simmons, PhD in Mathematics Education

#### External

Erika Rappold, Virginia Tech (Chair: Dr. Estrella Johnson) Tyler Sullivan, Clemson University (Chair: Dr. Matthew Voigt) Mehmet Kirmizi, Texas State University (Chairs: Dr. Sharon Strickland & Dr. Hiroko Warshauer)

#### Undergraduate honors thesis advising

Ryan Wang (exp. Fall 2023)

# **Project supervision**

• SoMSS Block Grant: Nicholas Heyer. (2023).

Naneh Apkarian, PhD

- SoMSS Block Grant: Jason Guglielmo. (2021). Social Structure in Undergraduate Mathematics Classrooms.
- Guglielmo, J., Bettersworth, Z., & Khan, I. (2022). Connecting STEM retention to student affect in Pathway mathematics courses. In In S. S. Karunakaran & A. Higgins (Eds.), Proceedings of the 24th Annual Conference on Research in Undergraduate Mathematics Education, 203-210. Boston, MA.

# TEACHING

## Arizona State University

#### **Mathematics**

MAT 170: Precalculus (SP21<sup>†</sup>, SP22) MAT 207: Algebra and Geometry in the High School (FA20<sup>†</sup>, FA23) MAT 208: Discrete Mathematics for Secondary Ed (SP23, SP24) **Mathematics Education** MTE 210: Mentored Tutoring Internship (FA20<sup>†</sup>, FA23) MTE 501: RUME I (FA22) MTE 502: RUME II (SP23) MTE 590: Reading and Conference (SP21<sup>†</sup>) MTE 591: Topic: Teaching Undergraduate Math Education Seminar (SP21<sup>†</sup>) MTE 591: Topic: Mathematics Education Research Seminar (SP21<sup>†</sup>) MTE 598: Topic: DEI in Undergraduate STEM Education Research (FA21, SP24) MTE 782: Internship (SP22) MTE 792: Research (SP21<sup>†</sup>, FA21, SP22, FA22)

#### Awards

Professor of Impact Award (x2). MAT 208 (Spring 2023).

#### **Previous teaching**

## San Diego State University (2013-16)

Elementary Number Systems. Graduate student instructor Differential Equations. Co-taught with Dr. Chris Rasmussen Dynamical Systems. Co-taught with Dr. Tommy Dreyfus

# University of California San Diego (2012 – 2013)

Cryptography. Co-taught with Dr. Adriano Garsia Geometric Computer Graphics. Co-taught with Dr. Adriano Garsia Linear Algebra. Graduate Teaching Assistant Differential Equations. Graduate Teaching Assistant

<sup>+</sup>Course taught online due to COVID-19

# **UNIVERSITY & DEPARTMENTAL SERVICE**

#### Committee/Center membership

- Research for Inclusive STEM Education (RISE) Center. ASU. Core member (2022-Ongoing)
- Colloquium & Seminar Committee. SoMSS. Member & Math Education Lead (2023-Ongoing)

Diversity, Equity, Inclusion, and Belonging committee. SoMSS. Member (2023-Ongoing)

# Student club advisor

- MORE: Mathematical Organization for Rehumanizing Education (2022-Ongoing)
- Armenian Student Association (2022-Ongoing)
- Women's Water Polo at ASU (2022-Ongoing)
  - ASU Sports Club of the Year (2022-23)
- Men's Water Polo Club at ASU (2022-Ongoing)

# Department/unit seminars

• Apkarian, N. (2022). The RUME Next Door. Bridge to Research Seminar. ASU SoMSS.

# **PROFESSIONAL SERVICE, OUTREACH, & ENGAGEMENT**

# Conference and workshop organization

- Annual Conference on Research in Undergraduate Mathematics Education. 2022-23; 2023-24. Omaha, NE. Program committee.
- Arizona Women's Symposium in Mathematics (AWSiM). November 2023. Flagstaff, AZ. Program committee.
- Initiating, Sustaining, and Researching Mathematics Department Transformation of Introductory Courses for STEM Majors. Mathematical Sciences Research Institute (MSRI) workshop in the annual series, Critical Issues in Mathematics Education (CIME). April 2021\* and March 2022. Hybrid/Berkeley, CA. (\*remote preliminary session). <u>https://www.msri.org/workshops/1028</u>. Co-organizer.
- Learning processes in mathematics between the whole class, small groups, and individual students. January 2020. Tel Aviv, Israel. Israeli Science Foundation, No. 438/15. Co-organizer.
- Annual Conference on Research in Undergraduate Mathematics Education. 2017, 2018. San Diego, CA. Local organizing committee.
- Linked Education Researchers of Networks in Undergraduate STEM. 2015-2016. San Diego, CA; Portland, OR. Co-organizer.
- Precalculus to Calculus: Insights and Innovations. June 2016. St. Paul, MN. Co-organizer.

# Professional development provided

- Infusing practical harm reduction strategies in the university mathematics classroom. IUPUI (2023).
- Infusing practical harm reduction strategies in the university mathematics classroom. Part of the OPEN Math project (<u>https://sites.google.com/view/openmath/home</u>) Winter 2022. Codeveloper & instructor.
- Facilitator (math) at Texas State course redesign summer institute, part of *Faculty-Student* Communities for Improving STEM Instruction (NSF #1928696)
- Facilitator at *Getting Started in Undergraduate Mathematics Education Research*, Project NExT session at the Joint Mathematics Meetings. Denver, CO. January 2020.

## Reviewing

- California Education Learning Lab "Seeding Strategies to Close the Calculus Equity Gap." Selection committee member. 2022. [website]
- National Science Foundation (NSF) panelist. 2020; 2022.
- Educational Studies in Mathematics (ESM). 2022-23.
- International Journal of Research in Undergraduate Mathematics Education (IJRUME). 2018-22.
- International Journal of STEM Education. 2018-20.
- Teaching Mathematics and Its Applications: International Journal of the IMA. 2023.
- Conference on Research in Undergraduate Mathematics Education. 2015-19, 2021.
- Problems, Resources, and Issues in Mathematics Undergraduate Studies (PRIMUS). 2016-2021.

## Outreach

- Guest Speaker at UCSD Undergraduate Mathematics Day, sponsored by AWM. May 2014.
- Volunteer Mentor for Expanding Your Horizons, San Diego. March 2014.

# Membership in professional communities

- Arizona State University AWM Chapter
- Association of Women in Mathematics (AWM)
- Mathematical Association of America (MAA)
- Special Interest Group of the Mathematical Association of America in Research in Undergraduate Mathematics Education (SIGMAA on RUME)
- Mentoring and Partnerships for Women in RUME (MPWR), 2015-2020
- Accelerating Systemic Change Network (ASCN)

# External committees & project advising

- Launch Years Math Organizations Leadership Network. (UT Austin Charles A. Dana Center).
- Examining The Roles of STEM Teaching Faculty in Advancing the Use of Evidence-based Teaching Practices at Research Universities. (NSF #1821724). Advisory Board Member.
- Catalyzing systemic change in undergraduate mathematics: A convening of mathematics leaders. (MAA).
- MPWR 2016 and Beyond: Fostering Sustainable Networks for Women in RUME (NSF #1553278). Evaluation consultant.

# Consulting

Cornell University (2019-2022)

 Invited external review of / consultation for ongoing improvement efforts for Calculus 1 and Linear Algebra at Cornell University, with particular attention to the implementation of active learning and other research-based strategies to support student success in mathematics

Florida International University (2019).

 Invited consultation regarding introductory mathematics courses, particularly how to leverage the existing resources and better coordinate ongoing initiatives to support STEM majors

Johns Hopkins University (2019)

- Invited external review of Johns Hopkins University's mathematics service courses program
- Provided recommendations and rationale for increasing support and quality of first- and second-year introductory mathematics course experiences for undergraduate students

Assessing the Impact of Teaching Faculty in STEM Institutional Transformation (NSF #1612258)

- Consultation about the development of social network analyses to assess the impact of the teaching faculty position in the University of California system on instructional practice
- Support for analysis and interpretation of social network data using R

# **PROFESSIONAL DEVELOPMENT / CONFERENCES ATTENDED**

- ACUE Microcredential in: Creating an Inclusive and Supportive Learning Environment. Association of College and University Educators. Spring 2023, Cohort C.
- Arizona Women's Symposium in Mathematics (AWSiM) November 2022. Prescott, AZ. [Conference]
- Third National Conference on Doctoral Programs in Mathematics Education. (Oct. 2022). Las Vegas, NV. [Invited Conference]
- The problematic math of college admissions. (Oct. 2022). Just Equations; TPSE Math, & Launch Years Initiative. [Webinar & Panel] <u>https://www.tpsemath.org/\_files/ugd/63a768\_938f2f11b41b4c1b8377c8858041fcd7.pdf</u>
- Student organization advisor training. (Spring 2022). Arizona State University.
- Building gender equity in the academy. (Feb-May 2021). AAAS SEA Change Institute/ [Virtual minicourse].
- Racism and anti-racism in STEM education. (Sept. 2021). QSIDE Institute. [Webinar].
- Labels matter: Methodology and data visualization. (Feb. 2021). QSIDE Institute. [Webinar].
- 4<sup>th</sup> Northeastern Conference on RUME. (Oct 2020). [Virtual conference].
- Why underrepresented minority students are leaving undergraduate research experiences. (Oct 2020). Arizona State University: SOLS Teaching Innovation Center. [Webinar].
- ASU Sync Workshop. (Summer 2020). Arizona State University. [Self-guided online course].

# **PRIOR RESEARCH INVOLVEMENT**

# Major involvement

Evaluating the Uptake of Research-Based Instructional Strategies in Undergraduate Chemistry, Mathematics, & Physics

NSF DUE #1726328, #1726281, #1726042, #1726126, #2028134 | sites.google.com/view/rbisproject

- Senior Personnel (2020-22)
- Postdoctoral Research Associate (2018-20)

Progress through Calculus (PtC)

NSF DUE #1430540 | www.maa.org/ptc

- Senior Personnel (2018-21)
- Research Assistant (2015-18)

Student Engagement in Mathematics through an Institutional Network for Active Learning (SEMINAL) NSF DUE #1624610, #1624643, #1624628, #1624639, 2016-2021 | <u>www.aplu.org/seminal</u>

- Senior Personnel (2020-21)
- Research Assistant (2015-20)

Knowledge Shifts in the Mathematics Classroom: The Roles of Students and Teachers Israeli Science Foundation, Grants No. 438/15, 2015-2019

Research Assistant

Exploring the Role of Instructors' Social Networks in Undergraduate STEM Instructional Improvement NSF DUE #1550990

Research Assistant

Research Experience for Undergraduates and Teachers 2009: Biomathematics Project San Diego State University

Undergraduate Research Assistant

## Limited involvement

Teaching Inquiry-oriented Mathematics: Establishing Supports (TIMES) NSF DUE #1431595, #143141, #1431393 | <u>times.math.vt.edu</u>

Research Assistant

Characteristics of Successful Programs in College Calculus (CSPCC) NSF DRL #0910240 | <u>www.maa.org/cspcc</u>

Research Assistant