Department of Mathematics

Self-Study Report

2022-2023

LEHMAN COLLEGE | CUNY

Table of Contents

Chapter 1: Introduction

Section 1.1. Lehman College Mission and Overview

> *Lehman College, an urban public institution and economic and cultural catalyst in the Bronx, is a national engine for social mobility and a vibrant center of discovery and creative work, providing a transformative educational experience while advancing equity, inclusion, and social justice.*
>
> *Lehman College Mission Statement*

Lehman College is part of The City University of New York, which comprises eleven senior colleges, seven community colleges, and seven honors, graduate, and professional schools. After existing since 1931 as the Bronx branch of Hunter College, known as Hunter-in-the-Bronx, Lehman College was established as an independent senior college within the CUNY system on July 1, 1968. It is named for Herbert H. Lehman, former Governor of New York State, U.S. Senator, and internationalist. His values of dedicated public service, commitment to human rights, and support for immigrants are embodied in many of the college's programs and initiatives today.

Lehman College, the only comprehensive public four-year college in the Bronx, serves a predominantly low income, underrepresented student population of roughly 14,400 drawing from 92 nationalities. The college provides an intellectual, economic, and cultural center for the Bronx and the surrounding region; it offers approximately 90 programs in undergraduate and graduate studies in the liberal arts and sciences as well as professional degrees. The college actively engages students in their academic, professional, and personal development, while embracing the diversity of its students, faculty and staff, and the surrounding community.

A top-ranked Hispanic-Serving Institution, Lehman's student population is a microcosm of the area it serves. Approximately 59% of undergraduates come from households with incomes below $30,000; 93% of undergraduates are from racialized communities; 88% of full-time freshmen

receive financial aid (72% Pell); and 53% speak a language other than English at home. Three out of five graduates in the spring 2019 class were the first in their families to earn college degrees, three out of five were born outside the United States, and one of every five was a parent. In 2020, the Brookings Institution recognized Lehman College as fourth in the nation among four-year universities with the greatest success in lifting low-income students into the middle class[1].

Lehman College offers 140 degree programs that are grounded in liberal arts and sciences, including 76 undergraduate majors and programs and 64 graduate degree programs, in addition to 33 graduate certificates. The faculty are committed to fostering students' critical skills and competencies that they will need for successful careers in the constantly evolving twenty-first century workplace, and to participate in their communities, in their state and nation, and in the international community as responsible citizens. To this end, Lehman strives to balance its proactive investments in technology and multimedia resources – including equipment, support, and professional development and certification for web-enhanced instruction – with the highest-quality in-person, hands-on traditional learning in our classrooms, laboratories, and studios.

Pivotal to providing these offerings are Lehman's diverse and dedicated employees, consisting of nearly 1,000 faculty (full-time and part-time) and over 600 staff. The college's nationally recognized faculty reside in the college's six schools – Arts and Humanities; Business; Continuing and Professional Studies; Education; Health Sciences, Human Services, and Nursing; and Natural and Social Sciences – where they serve as scholar-teachers, engaging with students in the latest disciplinary research and analysis. Lehman takes great pride in the diversity as well as productivity of its faculty.

Prior to the COVID pandemic, the College was experiencing a period of growth and development aligned with its mission and the mission of CUNY as a whole. While there has been a small

[1] http://www1.cuny.edu/mu/forum/2017/01/24/lehman-college-ranked-no-4-in-mobility-rate-for-students-in-the-u-s/

decrease in enrollment recently, our college is robust and growing in terms of access and opportunity. Excluding a recent decline, Lehman's enrollment had been expanding consistently since 2017, when total student enrollment reached its largest point since 1976 when the City University of New York discontinued its policy of free tuition for New York City students. In particular, the number of STEM students at Lehman increased by 96% between 2013-2017, the highest rate of increase in the entire City University of New York system. These high rates of student engagement with science, technology, engineering, and mathematics subjects have, for the most part, held steady.

The college's robust growth is also clear in its retention and graduation rates. Beginning in 2017, Lehman College's retention of first-time, full-time freshmen outpaced the CUNY senior college average by nearly 10%; the college's six-year graduation rate for first-time, full-time freshman has also increased and held steady, outpacing our fellow CUNY campuses significantly; Lehman's four-year graduation rate for transfer students from a CUNY Associate's Degree program also scored beyond the CUNY senior college average.

Section 1.2. Vision, Values, and Goals of the College

In 2017, Lehman College launched the 90x30 challenge, a bold initiative designed to increase educational attainment in the Bronx by awarding 90,000 or more degrees and credentials from the beginning of the initiative through 2030. The 90x30 challenge is a call to action to help boost educational attainment rates in the Bronx, which ranks next to last of all 62 counties in New York State. Only 27.7% of Bronx residents have an associate's degree or higher.

In 2021, Lehman College published its new strategic plan, "Lehman 2025: Roadmap to the Future," which will guide the direction of the college as a catalytic institution of and national engine of inclusive excellence in the next five years and likely beyond. Developed through collaboration with campus and external stakeholders, the plan focuses on strengthening

Lehman's long-term health and enhancing its visibility as one of the most innovative public colleges in the United States.

The new plan envisions Lehman College as a nationally recognized leader in educational attainment and the expansion of knowledge through innovative curriculum and pedagogy, original research and scholarship. and enhanced digital solutions. Furthermore, it asserts that the college will be a model of engaged citizenship and a leading force for a more just and sustainable world.

Beyond stating Lehman's vision, the 2025 roadmap also commits the college to five core values. They are as follows.

> **Social Justice.** Advocating for human rights, honoring differences, and working towards equality and equity for all.
>
> **Excellence**. Pursuing innovative teaching, research, and scholarship to produce a diverse pipeline of leaders and change agents committed to novel and sustainable solutions and igniting new possibilities.
>
> **Ethics.** Upholding the principles of academic freedom and demonstrating honesty, integrity, respect, and care in our interactions with others.
>
> **Diversity and Inclusion.** Fostering a campus environment that respects and values diverse perspectives and identities and where all members of the Lehman community experience a remarkable sense of belonging.
>
> **Service.** Empowering the local and international community through the increased engagement of faculty, staff, students, and alumni in outreach and partnerships contributing to individual achievement, economic development, and the common good.

Additionally, there are four key goals outlined and detailed in the new strategic plan. They are included immediately below.

> **Goal 1.** Educate, Empower, and Engage Students to Participate in a Global Society and Enhance Career Advancement.

Lehman College combines excellence in curriculum and student experiences to prepare graduates who are educated, engaged, and empowered change agents and self-assured members of a global society. Our programs and curriculum will reflect the changing needs of the region and students to result in equitable outcomes. Lehman College will increase its impact through purposeful enrollment growth, innovation in curriculum and delivery, and an intentional approach to bridging theory and practice.

Goal 2. Enhance Faculty and Staff Success.

Lehman College is led by a diverse community of faculty and staff whose creativity and innovation intersect with teaching, coaching, mentoring, scholarship and academic support to achieve excellence, create knowledge, transform the lives of students and establish a more just society. The college encourages and supports faculty and staff at each stage in their professional career from the initial recruitment of outstanding individuals through the professional life cycle to achieve excellence. Faculty and staff are expected to engage students in the joys and transformative power of the pursuit of knowledge and are supported in their efforts to do so.

Goal 3. Sustain Growth, Vitality, and Institutional Effectiveness.

Lehman College will create an inclusive, welcoming campus climate, ensure sustainable financial and fundraising models, and increase grant submissions. We will facilitate a culture of continuous improvement, optimize campus facilities, technologies and related infrastructure, and develop integrated communications to keep our community informed and enhance our regional and national visibility.

Goal 4. Embrace the Spirit of Community Engagement.

Lehman College will increase educational attainment as a purpose-driven institution, serve as a catalyst for social justice and change, and contribute to the region's vitality by expanding high quality educational programs to communities, creating strong talent pipelines that transform lives and ignite new possibilities for the region, and increasing collaborative opportunities and partnerships with local businesses, unions, cultural institutions, government agencies, and non-profit organizations.

The 2025 Roadmap calls on all campus stakeholders, including academic departments, faculty and staff, to participate in helping the college make progress towards fulfilling the stated vision,

values and goals. As a vibrant community of teachers, learners, scholars, and activists, at the crossroads of a promise, dedicated to an ideal etched in stone more than 50 years ago by our founders, to work together to "enrich the human spirit and offer to as many as [could] realize their potential, the opportunity to be so enriched." That ideal remains our mission and the focus of Lehman College.

Section 1.3: The Department of Mathematics Overview

The Department of Mathematics at Lehman College is one of ten departments housed in the School of Natural and Social Sciences. It is the largest department within the school (and college) with regards to number of students served. There are currently eighteen full-time faculty members: eight Full Professors (Behrstock, Karp, Lakic, Nathanson, Schneiderman, Sormani, Szabo, and Zeinalian), two Associate Professors (Fera and Owen), five Assistant Professors (Allen, Bell, Bettiol, Lynn, and Wynne) and three Lecturers (Cruz, Haxhoviq, and Johnson). There are also 4 full-time staff members: one Administrative Assistant (Bonilla), one Administrative Manager (Florin), one Director of Student Support Services (Gonzalez), and one College Lab Technician (Shiwmangal). Each semester, the Mathematics Department employs roughly 35 part-time teaching faculty as well to meet high course demand.

All Math Department faculty members are distinguished mathematicians in their field. They along with dedicated staff are committed to a positive student experience for anyone interested in mathematics, statistics, data analysis, quantitative reasoning, and/or a STEM related field.

Our department offers two different majors: a Bachelor's degree in Pure Mathematics and a Bachelor's degree in Economics and Mathematics. We also offer three minors – one in Pure Mathematics, one in Statistics, and one in Actuarial Mathematics. Each of our programs provides an enrolled undergraduate student some flexibility to tailor their study pans to best meet their interests and intended post-graduation plans. All of the programs seek to help prepare a student for further study and/or a career in STEM, industry, or education.

We also have a small graduate program that includes three different credentials. We offer a Master's degree in Pure Mathematics, a Master's degree in Mathematics and Instruction intended for in-service school teachers, and an Advanced Certificate in Actuarial Mathematics for those interested in pursuing a career as an actuary post-graduation. Each program has a dedicated adviser available to work with participating students.

Section 1.4. Mission and Core Values of the Department

The mission of the Mathematics Department is threefold:

1. to provide all Lehman students with a quality mathematics education whereby they can learn and develop the quantitative and critical thinking skills they need to successfully pursue their individual course of study and become effective members of their greater communities,
2. to contribute to the world's body of knowledge through research, scholarship, and professional partnerships, and
3. to serve the neighboring community through advocacy for education, career preparation for women and minorities, the training of teachers, and partnerships in industry and with local schools/businesses.

Our department is deeply committed to quality education, research, and service. We strive to place equal weight on all three stool legs in an effort to better serve our students, the mathematics discipline, and the surrounding Bronx and New York City community. We also contend that emphasizing these values equally best supports Lehman's overall mission in promoting social mobility, providing a transformative educational experience, and advancing equity, inclusion, and social justice.

With regards to education, our department works hard to meet Lehman students where they are mathematically. We firmly believe in eliminating obstacles, bottlenecks, and roadblocks in an effort to better serve students in their academic paths toward graduation. At the same time, we are also committed to maintaining high academic standards and honoring articulation

agreements across the CUNY system by setting a high bar. Therefore, we actively provide our students with the resources and skills that they need to ultimately demonstrate mastery in courses with uniform syllabi, clear learning objectives, and standardized assessments across multi-section courses. The more we demand and expect from our students, the more they can and will accomplish.

Our department also expects the best from our faculty when it comes to original research and scholarship. A critical objective of the Mathematics Department is to maintain a world-class research program – to continually contribute high-quality results to the world's body of mathematical knowledge through our research contributions in an effort to continually raise our department and school's research profile. All members of the Mathematics Department faculty are distinguished mathematicians that are well respected in their fields.

In an effort to serve the Bronx and the NYC community at large, the Mathematics Department regularly participates in both Lehman and CUNY outreach program efforts. In recent years, we have expanded our involvements with both the College Now and the Continuing Education programs to welcome more local high school students and adult-degree learners on campus to take math courses. Additionally, we have expanded our teacher training efforts by working closely with the NYC Department of Education (DOE). Recent collaborations include the NYC Teaching Fellows Program and the Algebra For All credential.

Chapter 2: Assessment, Curriculum, and Academic Service

Section 2.1. Program Goals and Objectives

The Department of Mathematics has adopted a standard set of quantitative reasoning, critical thinking, and mathematics skills that all mathematics majors/minors will acquire as they pass through the required program courses. These skills, called learning objectives and goals, are broad and not tied to any particular content. They are as follows:

A. Perform numeric and symbolic computations.
B. Construct and apply symbolic and graphical representation of functions.
C. Model real-life problems mathematically.
D. Use technology appropriately to analyze mathematical problems.
E. State and apply mathematical definitions and theorems.
F. Prove fundamental theorems.
G. Construct and present a rigorous mathematical argument.

Each core department course has its own set of content-specific learning outcomes. These course outcomes are typically included in the class syllabus and state which of the general program learning objectives and goals they address. Sample syllabi for select introductory level courses are included in Appendix A.

Section 2.2. Assessment and Course/Program Review

Formal assessment of Math Department courses and programs began in Spring, 2010. The assessment procedures and practices established then have remained in place (with only minor changes) for the past 12 years. A full-time faculty member serves as the department's assessment coordinator. This individual (currently Wynne) oversees all assessment efforts, works with the college's office of Assessment and Institutional Advancement on behalf of Mathematics, and receives 3 hours of reassigned time yearly from the institution.

Different courses are assessed each academic year on a yearly rotation. Assessment of introductory courses include a reevaluation of uniform syllabi, which provide a careful scheduling of course content chapter-by-chapter. Assessment of more advanced courses are done on an individual basis by the faculty instructing the course with support and guidance from the Math Assessment Coordinator. Department programs (i.e., majors and minors) are also reviewed and assessed by the Math Assessment Coordinator. Recommendations and changes to courses and/or programs are evaluated by a Math Department subcommittee, the Educational Policy Committee (EPC). The EPC is made up of 5 full-time faculty elected by department members to serve 3-year terms.

Course assessment is mainly done using data collected on department final exams. The data consists of student performance on final exam questions, each of which is directly aligned with course learning outcomes. Instructors report how many of their students successfully answered each final exam question; this data is collected by the assessment coordinator and used to create their report/recommendations. Overall, the process moves from data collection, followed by analysis, and ultimately to recommendations to the EPC for changes, if necessary. A critical step in this process is "closing the loop" – acting on the data collected in an effort to improve the course and advance student success. See Appendix B for past examples of Mathematics Program Assessment Reports.

Section 2.3: Undergraduate Programs

The Department of Mathematics offers two undergraduate majors: a Bachelor's degree in Pure Mathematics and a Bachelor's degree in Economics and Mathematics. We also offer students three different minor programs. They are a minor in Mathematics, a minor in Statistics, and a minor in Actuarial Mathematics. In this section, we detail the requirements for each, provide a program map outlining a recommended path towards completion (for the majors), and include brief descriptions of relevant Math (MAT) courses.

BA in Mathematics
To earn a BA degree in Mathematics, students must complete all of the following courses:

- MAT 175: Calculus I
- MAT 176: Calculus II
- MAT 226: Vector Calculus
- MAT 313: Elements of Linear Algebra
- MAT 314: Algebra and Number Systems I
- MAT 320: Analysis I
- CMP 167: Programming Methods I
- At least one of the following 3 courses:
    - MAT 330: Probability and Statistics
    - MAT 323: Ordinary Differential Equations
    - MAT 424: Partial Differential Equations and Applications

In addition, a student must earn 12-16 credits in four additional MAT courses chosen from among 200-level or higher with some restrictions.

Students wishing to major in Mathematics are advised to consider the following sequencing of courses as they work to complete the program:

Mathematics BA Degree Map

Year	Fall Courses	Spring Courses
Year 1	Precalculus	MAT 175: Calculus I MAT 155: Calculus I Lab
Year 2	MAT 176: Calculus II MAT 156: Calculus II Lab CMP 167: Programming Methods I	MAT 226: Vector Calculus MAT 313: Elements of Linear Algebra
Year 3	MAT 320: Analysis I MAT 330: Probability and Statistics	MAT 314: Algebra and Number Systems I MAT XXX: Elective 1
Year 4	MAT XXX: Elective 2 MAT XXX: Elective 3	MAT XXX: Elective 4

BA in Economics and Mathematics
To earn a BA in Economics and Mathematics, students must complete all of the following courses:

Mathematics:

- MAT 175: Calculus I
- MAT 176: Calculus II
- MAT 226: Vector Calculus
- MAT 301: Applied Statistics and Computer Analysis for Social Scientists
- MAT 313: Elements of Linear Algebra
- MAT 330: Probability and Statistics
- At least one of the following courses:
    - MAT 347: Game Theory and Linear Programming
    - MAT 349: Operations Research
    - MAT 424: Partial Differential Equations and Applications

Economics

- ECO 166: Introduction to Macroeconomics
- ECO 167: Introduction to Microeconomics
- ECO 300: Intermediate Macroeconomics
- ECO 301: Intermediate Microeconomics
- ECO 302: Economic Statistics
- ECO 401: Introduction to Mathematical Economics
- ECO 402: Econometrics
- Two additional Economics electives

Students wishing to major in Economics and Mathematics are advised to consider the following sequencing of courses as they work to complete the program:

Economics and Mathematics BA Degree Map

Year	Fall Courses	Spring Courses
Year 1	Precalculus ECO 166: Intro Macroeconomics	MAT 175: Calculus I MAT 155: Calculus I Lab ECO 167: Intro Microeconomics
Year 2	MAT 176: Calculus II MAT 156: Calculus II Lab ECO 302: Economic Statistics	MAT 226: Vector Calculus MAT 301: Applied Statistics
Year 3	MAT 313: Elements of Linear Algebra ECO 300: Intermediate Macroeconomics	MAT 330: Probability and Statistics ECO 301: Intermediate Microeconomics ECO XXX: Required Elective 1
Year 4	ECO 402: Econometrics MAT XXX: Required Elective	ECO 401: Mathematical Economics ECO XXX: Required Elective 2

Minor in Mathematics

To earn a minor in Mathematics, students must complete 12 credits at the 200 level or above, with at least 6 at the 300 level or above. All grades must be C- or better.

Students not majoring in Computer Science must include:

- MAT 226: Vector Calculus, and
- MAT 313: Elements of Linear Algebra

Students majoring in Computer Science, who elect to have a minor in Mathematics, must include MAT 320: Analysis I. Additionally, students majoring in Computer Science cannot use any MAT courses towards their minor that they are already applying towards their major.

Minor in Statistics

The Statistics minor is designed to provide foundational training in probability, statistics, and the use of data in applied settings. Students will be exposed to both statistical theory and practice. This minor is designed to complement major degree programs primarily in the natural and social sciences.

To earn a minor in Statistics, students must complete the following two courses:

- MAT 327: Statistical Inference
- MAT 330: Probability and Statistics

In addition, students must complete at least one of the following courses:

- MAT 328: Techniques in Data Science
- MAT 458: Topics in Statistics
- ECO 402: Econometrics
- SOC 345: Quantitative Analysis of Sociological Data
- SOC 348: Reasoning with Data

Minor in Actuarial Mathematics

The Actuarial Mathematics minor is designed to provide broad training in the basic mathematics needed to pursue a career in actuarial science. Special attention is given to probability, financial mathematics, and mathematical statistics. The courses are organized to assist the student to prepare for both the Actuarial P and Actuarial FM Exams; the program also includes a course recognized by the Society of Actuaries for Validation by Educational Experience (VEE) credit.

To earn a minor in Actuarial Mathematics, students must complete the following 3 courses:

- MAT 327: Mathematical Statistics
- MAT 430: Advanced Probability and Applications*
- MAT 464: Advanced Financial Mathematics and Applications**

*MAT 430 has a prerequisite of MAT 330: Probability and Statistics.
**MAT 464 has a prerequisite of MAT 364: Financial Mathematics.

Brief Descriptions of Relevant MAT Courses

The information in this section is taken from the Lehman College Undergraduate Bulletin 2022-2024. Please refer to this bulletin for a full list of MAT courses including many elective options not included here.

MAT 175: Calculus I (4 credits). Differentiation of functions of one variable; applications to motion problems, maximum-minimum problems, curve sketching, and mean-value theorems.

MAT 176: Calculus II (4 credits). Riemann sums, logarithmic and exponential functions, integration of functions, applications of the definite integral, including area, volume, and arc length, infinite series and power series in one variable.

MAT 226: Vector Calculus (4 credits). Vectors in two and three dimensions, equations of lines and planes, functions of several variables, partial differentiation, directional derivatives, gradients, optimization with Lagrange multipliers, multiple integration, line integrals, and vector fields.

MAT 313: Elements of Linear Algebra (4 credits). Vector spaces, systems of linear equations, determinants, linear transformations, and matrices.

MAT 314: Algebra and Number Systems I (4 Credits). Algebraic structures such as groups, rings, and fields; their relations and applications to school and college mathematics, including the number systems of arithmetic and analysis.

MAT 320: Analysis I (4 Credits). Introduction to real analysis, the real number system, limits, continuity, differentiation, the mean value, and Taylor's theorems and applications. Riemann integration and improper integrals.

MAT 323: Ordinary Differential Equations (4 Credits). Exact and approximate solutions of ordinary differential equations, existence theorems, and applications to problems in the physical sciences. Series solutions, Laplace transforms and Fourier analysis. Computer applications.

MAT 327: Statistical Inference (4 Credits). Introduction to the ideas and methods of probability and statistical inference for students in mathematics and the sciences. Topics include confidence intervals, tests of significance, chi-square tests of goodness-of-fit and independence, regression analysis, and analysis of variance. Students will be introduced to a standard computer statistical package.

MAT 330: Probability and Statistics (4 Credits). Basic probability theory. Combinatorial problems, distributions, expectation, law of large numbers and central limit theorem, Bernoulli processes and Markov chains. Other topics from probability and statistics.

MAT 364: Financial Mathematics (4 Credits). Simple interest, compound interest, force of interest, time value of money, present and future values, level annuities, increasing and decreasing annuities, arithmetic and geometric progressions, loans and amortization, outstanding balance at any time, interest and principal payments at any time, price of a bond, immunization, interest rate swaps, stocks.

MAT 430: Advanced Probability and Applications (4 Credits). Conditional probability, applications of Bayes' theorem; prominent examples of probability mass and density functions; moments and central moments, moment generating function, probability generating functions, joint and marginal distributions, linear combination of linearly independent random variables, and applications of the central limit theorem. A strong emphasis on applying theory to problem-solving.

MAT 464: Advanced Financial Mathematics and Applications (4 Credits). Further study of cash flows and rates, arithmetic and geometric annuities, loans, retrospective and prospective methods, bonds, callable bonds, dollar and time-weighted rates of return, duration and convexity

of a set of cash flows, spot rates, Redington immunization, interest rate swaps. A strong emphasis on applying theory to problem-solving.

Section 2.4. Graduate Programs

The Department of Mathematics has a small graduate program that offers students three different credential programs. We offer a Master's degree in pure Mathematics, a Master's degree in Mathematics and Instruction for in-service teachers, and a certificate in Actuarial Mathematics. The requirements for each of these programs is included below along with a program map outlining a recommended path towards completion and relevant MAT course descriptions.

Master's Degree in Mathematics

The Mathematics MA in Pure Mathematics is offered for (a) students who may eventually work towards a doctorate in Mathematics; (b) those who seek the MA as a terminal degree; (c) graduates of the Secondary School Teachers of Mathematics seeking additional graduate credits in Mathematics; (d) qualified students who wish to take individual graduate mathematics courses.

Our program is the only public graduate Mathematics program in the Bronx. Additionally, it is appealing to students for each of the following reasons:

- Convenience: The program is flexible, with evening classes that meet only twice a week, and can be completed in as few as 3 semesters.
- Benefits for Teachers: Go on to earn a professional license to teach in the New York DOE, or become eligible for part-time and adjunct jobs at CUNY, or earn additional credits to potentially increase your pay scale
- Research Experience: Engage in seminars and research opportunities with dedicated faculty and obtain a deeper understanding of mathematics.
- Competitive Edge: Earn a graduate credential in a respected academic field, participate in career workshops, and attend academic events across all college disciplines.

- Industry Training: Incorporate coursework in financial mathematics, data/statistical analysis, and actuarial mathematics to potentially pursue career opportunities in highly marketable fields.

For admission into the MA Mathematics program, candidates must:

- Have a bachelor's degree or its equivalent from an accredited college.
- Demonstrate the potential to successfully pursue graduate study.
- Have completed coursework in Calculus I, Calculus II, Vector Calculus, Linear Algebra, Abstract Algebra, and Advanced Calculus/Analysis.

To earn an MA in Pure Mathematics, students must complete at least 30 credits in graduate level Mathematics course work. The following three courses are required:

- MAT 616: Algebra
- MAT 751: Theory of Functions of a Real Variable
- Mat 753: Theory of Functions of a Complex Variable I

The remaining coursework must be chosen in consultation with the graduate adviser. A written comprehensive exam in the 3 required courses is also required to complete the degree.

Master's Degree in Mathematics and Instruction

The MA in Mathematics and Instruction is designed for in-service 7-12 Mathematics teachers that already hold an initial teaching certificate. This program is registered with the NYC Board of Education and leads to a professional teaching credential upon completion of the program and masters. While the Mathematics and Instruction program is considered to be a "Math Teacher Master's Program," it is the only such program housed in the Department of Mathematics. All others are housed in the Department of Middle and Highschool Education Department. Additionally, the Mathematics and Instruction program is predominately made up of mathematics content courses rather than mathematics pedagogy courses.

For admission into the MA Mathematics and Instruction program, candidates must:

- Have a bachelor's degree or its equivalent from an accredited college.
- Hold an initial New York State Teaching Certification in Mathematics Education, Grades 7-12.
- Demonstrate the potential to pursue graduate study.

- Have completed coursework in Calculus I, Calculus II, Vector Calculus, Linear Algebra, and Discrete Mathematics.
- Completed a course equivalent to ESC 506: Special Needs Education in TESOL and Secondary Settings or EDS 701: Understanding Individuals with Disabilities.

To earn an MA in Mathematics and Instruction, students must complete at least 21 credits in Mathematics and at least 9 credits in Math Education. For Mathematics, a student is required to take:

- MAT 601: Secondary School Mathematics From an Advanced Perspective
- At least one class in Analysis
- At least one class in Algebra
- At least one class in Geometry

For Math Education, a student is required to take the following three courses:

- ESC 740: Teaching Mathematics in Grades 7-10
- ESC 748: Teaching Problem Solving in Mathematics in Middle and High School
- ESC 749: Teaching Mathematics in Grades 11 and 12

A written comprehensive exam based on 4 Mathematics courses is also required to complete the degree.

Advanced Certificate Program in Actuarial Mathematics

The Advanced Certificate in Actuarial Mathematics is designed to provide broad training in the basic mathematics needed to pursue a career in actuarial science. Special attention is given to probability, financial mathematics, and mathematical statistics. The courses are organized to assist the student to prepare for both the Actuarial P and Actuarial FM Exams; the program also includes a course recognized by the Society of Actuaries for Validation by Educational Experience (VEE) credit.

For admission into the Actuarial Mathematics Advanced Certificate program, candidates must:

- Have a bachelor's degree or its equivalent from an accredited college or university.
- Demonstrate the potential to successfully pursue graduate study.
- Have completed courses in Calculus I and Calculus II.

To earn the Advanced Certificate in Actuarial Mathematics, students must complete the following 5 courses:

- MAT 664: Financial Mathematics
- MAT 681: Probability
- MAT 764: Advanced Financial Mathematics and Applications
- MAT 781: Advanced Probability and Applications
- MAT 782: Mathematical Statistics

Applicants may apply for advanced standing in the program and can be exempt from one or more of the required courses by submitting detailed course descriptions to the program adviser.

Brief Descriptions of Relevant MAT Courses

The information in this section is taken from the Lehman College Graduate Bulletin 2022-2024. Please refer to this bulletin for a full list of MAT courses including many elective options not included here.

MAT 601: Secondary School Mathematics From An Advanced Perspective (3 Credits). This course will cover topics chosen from the theory of arithmetic, logic, probability, and geometry that are of particular interest to teachers of secondary school mathematics. *Only for Math Teacher programs.*

MAT 602: Introduction to Number Theory and Modern Algebra I (3 Credits). Topics from number theory that have special relevance to the intermediate school program will be considered. These include prime numbers, unique factorization, congruences, Diophantine equations, and Fermat's theorem. Abstract algebra, including equivalence relations and some group theory, will be interwoven in the development, but the primary emphasis is on the number systems that could be considered in the intermediate schools. *Only for Math Teacher programs.*

MAT 604: Application of the Real and Complex Number Systems (3 Credits). A study of irrational numbers, the algebraic properties of the complex numbers and polynomials over the integers, rationals, and reals through a concrete, nonabstract approach. Applications in the theory of equations and inequalities.

MAT 616: Algebra (4 Credits). Group theory, including finitely generated Abelian groups, Sylow's theorem(s), simple groups, solvable groups. Ring theory, including integral domains, Euclidean rings. Field theory, including finite field extensions, Galois theory.

MAT 664: Financial Mathematics (4 Credits). Interest schemes, annuities, amortization, loans, immunization, stocks, bonds, and further topics as time permits.

MAT 655: Exploring Mathematics Using Technology (2 Credits). Use of tools of technology (such as Computer Algebra systems and graphing calculators) to explore ideas, concepts, and techniques in various areas of mathematics, such as calculus and probability.

MAT 681: Probability (4 Credits). Probability models, combinatorial problems, random variables, expectation and variance, binomial, normal and Poisson variables, law of large numbers, central-limit theorem, markov chains, and selected additional topics.

MAT 751: Theory of Functions of a Real Variable (4 Credits). Real number system, metric and Banach spaces; applications; the Lebesgue integral; measurable sets and functions; Lp spaces and Hilbert spaces; measure spaces and Daniell integral; Riemann-Stieltjes integral; Radon-Nikodym theorem; and Stone-Weierstrass theorem.

MAT 753: Theory of Functions of a Complex Variable (4 Credits). Algebra and geometry of complex numbers, analytic functions, Taylor and Laurent Series, Abel's Limit Theorem, meromorphic functions, residue calculus, Cauchy integral theorem and applications, classification of functions by singularities, analytic continuation, linear transformations, the cross ratio, conformal mapping, the Riemann Sphere.

MAT 764: Advanced Financial Mathematics and Applications (4 Credits). Advanced topics in Financial Mathematics with a focus on applications and problem solving. Topics include cash flows and rates, arithmetic and geometric annuities, advanced ideas in bonds and immunization, and interest rate swaps.

MAT 781: Advanced Probability and Applications (4 Credits). Advanced topics in Probability with an emphasis on applications and problem solving. Topics include applications of Bayes' theorem, the Central Limit Theorem, moment and probability generating functions. Further investigation of random variables and distributions also included.

MAT 782: Mathematical Statistics (4 Credits). Fundamental concepts of statistics. Point estimation, maximum likelihood estimators, hypothesis testing, confidence regions, t-test, analysis of variance, non-parametric tests, chi-square goodness-of-fit tests, correlation, regression analysis, and selected additional topics.

Section 2.5. Service to the College

Roughly ten years ago, CUNY uniformized a general education requirement program across all of its institutions. This set of requirements, known as CUNY Pathways, was intended to create more equitable transfer practices for students moving from one school to another within the university. The Quantitative Reasoning (QR) requirement in CUNY Pathways is the one most relevant to mathematics as it essentially requires all Lehman students to complete at least one QR-approved MAT course in order to qualify for graduation. A large majority of students at Lehman take at least one MAT course in the Department of Mathematics to satisfy this requirement.

As specified by CUNY, a course in the QR area must meet all of the following learning outcomes. A student must:

- Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, and tables.
- Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
- Represent quantitative problems expressed in natural language in a suitable mathematical format.
- Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.
- Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.
- Apply mathematical to problems in other fields of study.

The following is a list and brief description of all of the mathematics courses at Lehman which have been QR-approved by CUNY.

MAT 126: Quantitative Reasoning (4 Credits). Survey of modern quantitative techniques in a variety of disciplines. Critical thinking and mathematical/quantitative literacy are emphasized.

MAT 128: Foundations of Data Science (4 Credits). Statistical and computational tools for analyzing data. Acquiring data from multiple sources, techniques for efficiently traversing, storing, and manipulating data. Emphasis on statistical analysis and visualization of real data.

MAT 132: Introduction to Statistics (4 Credits). Collection, plotting, and comparison of data sets, histograms, descriptive statistics, the frequency definition of probability, random experiments, random sampling, binomial and normal variables, confidence intervals and tests of hypotheses for binomial and normal parameters. Additional topics chosen from tests for the difference of proportions or population means, the Chi Square test, and regression analysis. Introduction to a computer statistical package.

MAT 171: Elements of Precalculus (4 Credits). The use of functions, graphs, and matrices to solve various applied problems. Geometry of linear, quadratic, logarithmic, and exponential functions.

MAT 172: Precalculus (4 Credits). Polynomial, rational, logarithmic, and trigonometric functions, with applications to problems in mathematics and the sciences.

MAT 175/176 (Included above).

Section 2.6. Service to Departments and Programs

In addition to servicing the college's general education requirement in quantitative reasoning, the Mathematics Department also supports departments and programs across the college with its course offerings. In many cases, this curriculum support goes beyond providing the traditional coursework required of STEM majors and pre-medical students.

Service to Computer Science

The Computer Science Department offers both a BA and a BS degree in Computer Science. Combined, these programs require that their students complete the following MAT courses:

- MAT 175: Calculus I
- MAT 176: Calculus II
- MAT 313: Linear Algebra

Descriptions for these courses can be found in Section 2.2.

In addition, Computer Science majors must complete MAT 226: Vector Calculus to access some of the more advanced Computer Science electives. Computer Science majors are also expected/encouraged to complete a number of additional elective MAT courses to complete their major.

Computer Science also offers a Bachelor's degree in Computer Information Systems (CIS). Students majoring in CIS complete a series of introductory level MAT classes followed by two more advanced MAT courses intended almost solely for the CIS students. The introductory courses taken by CIS majors are as follows,

- MAT 132: Introduction to Statistics
- MAT 171: Elements of Precalculus
- MAT 174: Elements of Calculus

Descriptions for these courses can be found in Section 2.4. The two advanced MAT courses required of CIS majors are,

MAT 301: Applied Statistics and Computer Analysis for Social Scientists (4 Credits). An elementary treatment of statistical concepts. Data analysis using standard statistical methods available in the Statistical Package for Social Scientists. Computations will be run on a computer. Interpretation and misinterpretation of computer output.

MAT 348: Mathematical Methods for Management (4 Credits). Conditions for optimization, classical inventory problems. Linear programming and its applications, including the transportation problem. Use of software packages for linear programming calculations. Probability, expectation, and risk. Portfolio selection. Stochastic processes and queues. Computer simulation of stochastic processes.

These two classes are usually taught by part-time faculty members (Hellman, Njoh, and Shah). Collectively, they have the content expertise required to instruct these courses.

Service to Math Education

The Department of Mathematics offers a large number of undergraduate and graduate level courses exclusively to service Math Education programs. For Lehman's elementary education program, Math offers three introductory level MAT courses intended for pre-service and in-service elementary and middle school teachers:

MAT 123: Number Systems and Number Theory For Educators (3 Credits). Properties of counting numbers, integers, rationals and reals; elementary number theory. Operations, computations, and historical developments of these ideas also included. Note. Intended for pre-service elementary and middle school teachers.

MAT 124: Algebraic Functions and Thinking For Educators (3 Credits). Using generalization, algebraic structures, and reasoning to represent and analyze mathematical situations. In-depth attention given to functions, modeling, and the transition from arithmetic to algebra. Note. Intended for pre-service elementary and middle school teachers.

MAT 125: Explorations in Geometry, Probability, and Statistics For Educators (3 Credits). Foundational content in geometry, probability, and statistics using accessible and relevant technology. Measurement, length, area, volume, transformations, experimental design, descriptive measures, sample space, and success. Note. Intended for pre-service elementary and middle school teachers.

MAT 124 and MAT 125 are brand new courses, just approved by the Lehman College Senate in the Spring 2022 semester and subsequently by the CUNY Board of Trustees in Summer 2022. Currently, none of these three courses can be used to satisfy the CUNY Pathway's QR requirement. The Math Department plans to submit these courses to CUNY Central so that students can use any of these classes towards their graduation degree requirement. Then, the Department plans to offer these classes on a rotating basis (Fall, Spring, Summer) to optimize enrollment and offer more content support to elementary and middle school educators.

The Department of Mathematics has a very strong connection and highly collaborative working relationship with the Department of Middle and High School Education (MHS). One full-time faculty member, Dr. Celia Cruz, is technically shared by both Departments; her appointment is

60% in Mathematics and 40% in MHS. Though Dr. Cruz's tenure standing will ultimately reside in the Department of Mathematics, she is a fully participating member in both departments and serves a liaison between the two on all matters.

Students seeking a license to teach grades 7-12 Mathematics in a public school are required to major in Mathematics, minor in Math Education, and to complete all New York State requirements for an initial teaching certification credential. Additionally, in-service 7-12 Math teachers who have already earned initial certification are required to complete a graduate degree and earn their professional teaching license to continue teaching in the public sector.

The Department of Mathematics services all Math Education programs, including their graduate programs that lead students to initial and/or professional certification. Typically, graduate level programs in Math Education are a total of 30 credits, with roughly a third of these credits being MAT courses. The remaining credits are taken in Math Education; they focus on pedagogy and educational theory.

The MAT courses taken by Math Education graduate program students are the same as those taken by graduate students in the Mathematics and Instruction Program (see Section 2.4). The important difference is that Mathematics and Instruction students take roughly two-thirds of their 30-credits in Mathematics and only one third in Math Education. Programs in Math Education focus more on education, while the Mathematics and Instruction program is more driven by Mathematics content.

Service to Data Science

Lehman Colleges offers students an interdisciplinary minor in Data Science, formally called the Data Science Methods and Applications Interdisciplinary Minor. One full-time faculty member in Mathematics (Owen) played a central role in the development of this program. In fact, Professor Owen helped to design and now regularly teaches the introductory course in Data Science (MAT

128, see Section 2.5) required by all students completing the minor. Professor Owen also teaches an advanced-level elective for the Data Science program. A brief description of this class is provided below.

MAT 328: Techniques in Data Science (4 Credits). Analyzing data sets to extract new insights. Acquisition, data mining, storage, and visualization of real-world data using scripting and statistical programming languages. Application of standard statistical tools including hypothesis testing, Bayesian analysis, bootstrapping and regression. Classifying and clustering multidimensional data sets via dimensionality reduction and machine learning techniques.

Chapter 3: Students, Services, and Associated Supports

Section 3.1. The Lehman Student Population

Lehman College is primarily an undergraduate serving institution with just under 14,400 total students enrolled (in Fall 2021). Of this total, roughly 86% are undergraduates and 14% are graduate students. The gender breakdown of our student population is 69.4% female and 30.6% male. Just under 50% of students are age 22 and younger and about 14% are 35 years of age or older.

A majority of Lehman students (around 57%) are first generation college students and close to one-third were born outside the United States. More than half of our students (54%) come from households with an income below $30,000 per year. Over 60% of Lehman students reside in the Bronx, just under 20% come from Manhattan and the other NYC boroughs, and the rest live in Westchester County.

The chart below shows a breakdown of Lehman students by race/ethnicity.

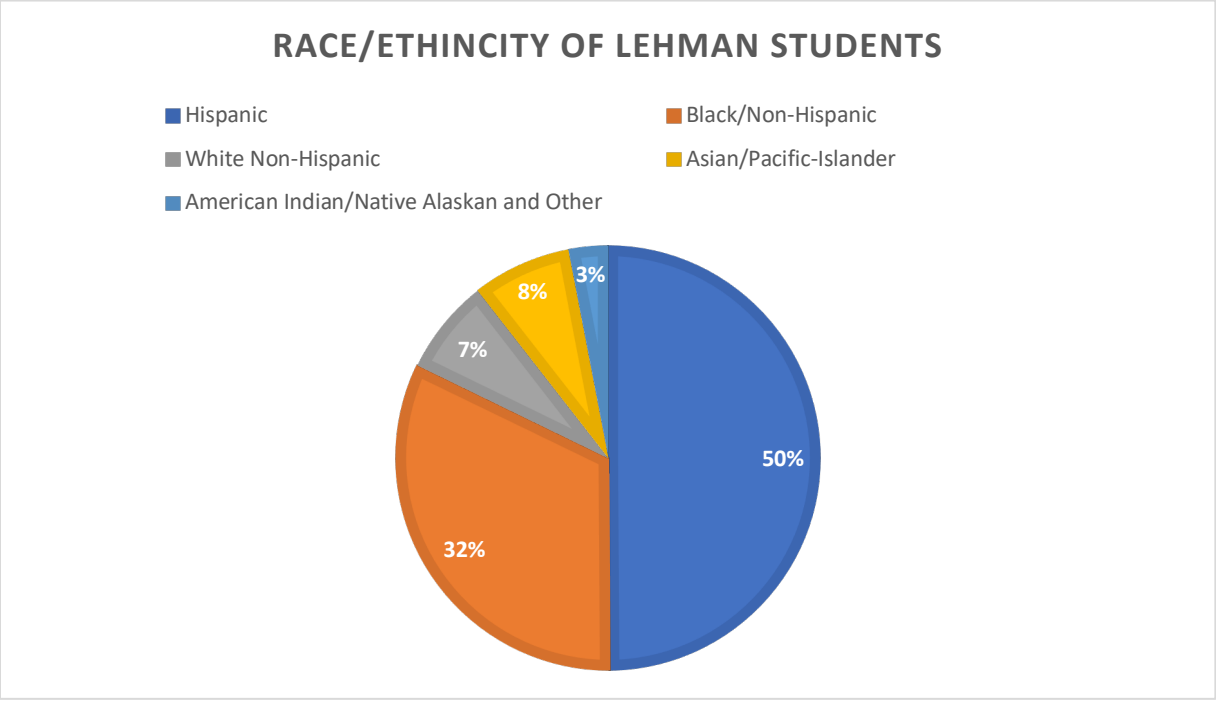

Figure 3.1. Race/Ethnicity distribution of Lehman College Students

As can be seen, just about 50% of Lehman's student population is Hispanic and just under one-third is Black/Non-Hispanic. A large majority (77%) of Lehman students receive some type of grant or scholarship to pay for their tuition; 66% receive a Federal Pell Grant and about 2.3% borrowed a loan.

Table 3.1 shows a breakdown of Lehman's Fall 2021 student population by admission and degree type. Just over 10% of Lehman's population is comprised of transfer students, mostly from other CUNY schools. All first-time freshmen students must take and pass a Mathematics course to make progress towards graduation. While some transfer students complete their general education requirements at their previous institution, many still need Mathematics courses to fulfill major and/or program requirements.

Type	Admission Type	Count	Percent of Total
Undergraduate	Continuing	9,154	63.6%
	First-time Freshmen	1,582	11%
	Transfers	1,639	11.4%
Graduate	Continuing	1,387	9.6%
	New Student	630	4.4%
Total		14,392	100%

Table 3.1. Fall 2021 student population broken down by admission and degree type.

The 4-year and 6-year graduation rates for first-time freshmen vs. transfer students is shown in Table 3.2 below. The table includes the most recent 5-years of data, which is student cohorts from 2015, 2014, 2013, 2012, and 2011. Over this time period, rates have stayed mostly the same with an increase in all categories when compared to the 2011 baseline.

Year	4-Year Graduation Rate		6-Year Graduation Rate	
	First-time Freshmen	Transfer	First-Time Freshmen	Transfer
2015	27.9%	58.6%	53.1%	64.0%
2014	28.2%	59.5%	53.2%	65.5%
2013	24.2%	57.1%	52.9%	63.8%
2012	23.6%	55.1%	49.0%	63.9%
2011	20.4%	54.0%	45.6%	60.6%

Table 3.2. Four-year and six-year graduation rates for first-time freshmen vs. transfer students at Lehman College for student cohorts entering 2011-2015.

For comparison, the National Center for Education Statistics reports that, for student cohorts beginning in 2014, the 6-year graduation rate at public universities across the United States was 63%. This includes both first-time freshmen and transfer students. For this cohort of students, Lehman's 6-year graduation rate was 61.2%.

Section 3.2. Math Student Enrollment

Mathematics is the largest department at Lehman College with regards to course enrollments. These large enrollments are due to the heavy amount of service Mathematics supplies to the College and the various academic degree programs that it supports. Service courses are mainly 100-level and introductory in content.

Table 3.3 shows enrollment across all Mathematics courses for the past 5 years separated by semester. Additionally, the table shows the distribution of this enrollment by course level: introductory (100-level) vs non-introductory (200+ level). As seen, a majority of Math enrollments come from the introductory courses. This is especially true in the Fall terms where 100-level seats comprise close to 85% of Math's total enrollments.

Semester	Total Enrollment	Percent Introductory	Percent Non-Introductory
Fall 2022	2996	82.18%	17.82%
Summer 2022	560	70.54%	29.46%
Spring 2022	2451	79.72%	20.28%
Fall 2021	3735	84.34%	15.66%
Summer 2021	743	68.51%	31.49%
Spring 2021	2396	75.00%	25.00%
Fall 2020	3387	83.14%	16.86%
Summer 2020	650	52.92%	47.08%
Spring 2020	2519	77.41%	22.59%
Fall 2019	3441	85.15%	14.85%
Summer 2019	700	44.00%	56.00%
Spring 2019	2780	80.58%	19.42%
Fall 2018	3043	82.75%	17.75%
Summer 2018	513	62.77%	37.23%
Spring 2018	2784	81.90%	18.10%

Table 3.3. Math enrollments over the past 5 years broken down by semester and differentiated by intro v. non-intro.

Figure 3.2 shows both Math course and Lehman College enrollments from 2016-2021. In the years leading up the pandemic, Lehman College enrollments increased steadily and substantially. As a result, math course enrollments also increased at a steady rate. The COVID-19 pandemic had a negative impact on student enrollments CUNY-wide. This too has had a negative impact on Math course enrollments. Still, from 2016 to 2021 Math's total course enrollments per calendar year have been between 42% and 47% of the College's total enrollment.

Student enrollment in Math Department academic programs over the past six years is presented in Table 3.4. Majors includes both Math BA students and Economics and Math BA students, though there have been less than 5 students in the latter for all the years included. Masters' students include those enrolled in the Math MA and the Math and Instruction MA, though there have been 1 or fewer in the latter for all the years included, as well. While the Department currently has three different minors, the ones in Actuarial Mathematics and Statistics are new and there is no data on these programs yet. Therefore, the minor numbers included in Table 3.4 are only for the Math minor.

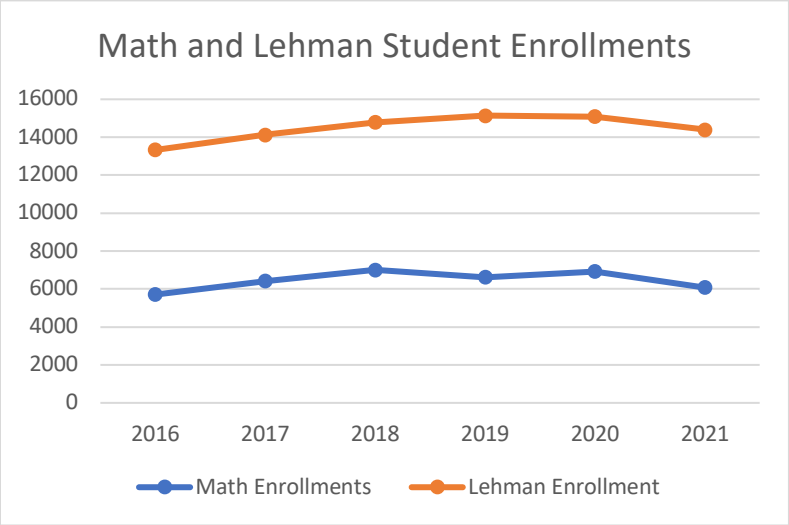

Figure 3.2 Math course and total Lehman student enrollments from 2016 to 2021.

Year	Majors	Minors	Masters
2016	137	30	20
2017	137	30	24
2018	141	32	12
2019	146	31	15
2020	116	29	17
2021	103	25	10

Table 3.4 Math program enrollments 2016-2021

Section 3.3. More About Math Students

In 2018 and 2019, junior and senior level math majors were given a survey about their experience in the Math BA program. The survey asked 13 different 5-point, Likert-scale questions, with responses ranging from poor (1) to excellent (5). The questions and average responses per question for each of the two years that the survey was administered is shown in Table 3.5. The number of responses (n) is also provided.

Question	2018 Average Response (n=18)	2019 Average Response (n=13)
1. How well has the Lehman Math Department prepared you to perform numeric and symbolic computations?	4.22	4.17
2. How well has the Lehman Math Department prepared you to construct and apply symbolic and graphical representations of functions?	3.94	4.17
3. How well has the Lehman Math Department prepared you to model real-life problems mathematically?	3.56	3.83
4. How well has the Lehman Math Department prepared you to use technology appropriately to analyze mathematical problems?	3.67	3.58
5. How well has the Lehman Math Department prepared you to state and apply mathematical definitions and theorems?	3.94	4.25
6. How well has the Lehman Math Department prepared you to prove fundamental theorems?	3.67	4.42
7. How well has the Lehman Math Department prepared you to construct and present a rigorous mathematical argument?	3.78	3.92
8. Selection of courses.	3.23	4.17
9. Structure of major.	3.78	4.25
10. Classroom instruction.	3.78	4.08
11. Major advising.	4.00	4.42
12. Overall interaction with faculty.	3.94	4.08
13. Interaction with fellow majors.	3.78	3.67

Table 3.5 Math major average survey responses for 2018 and 2019.

In addition to the 13 Likert-scale questions, the survey also provided two free response questions. These questions, along with select responses (presented by year) are included below.

Q. What aspects of the math program at Lehman were most positive and helpful to you?

2018 selected responses:

- The availability of professors and their help in preparing for graduate school.
- Everything.
- Academic advising.
- Tutoring lab.
- The professors are very good at explaining material.

2019 selected responses:

- Most instructors were great!
- The dedication and personal assistance from professors. Because of this, I was able to figure out what fields I am interested in and gain opportunities in them.
- The most positive were the availability to the staff if I needed any help, they were there to guide me.
- There were a variety of courses to choose from, which was very much appreciated.
- The openness to speak to professors regarding coursework, research, and careers in Mathematics.
- The faculty.

Q. What aspects of the math program at Lehman do you feel could be improved?

2018 selected responses:

- The frequency of higher-level courses being offered (every other semester is not helpful) and by how many professors it's being taught (schedule purposes).
- Better boards in the classroom
- Better professors
- There should be more options available for math core classes. For example, more than one professor teaching a math course that is required for graduation. More math elective as well and if possible, include more Math 200 level courses.
- More opportunities for internships and ways to improve your resume in the field.

2019 selected responses:

- I would like it if there were class sections for the advanced courses.
- Instructors.

- More upper-level coursework and more weekly or monthly lectures on current math work being done.
- The course content requires more than 4 years.
- The variety of professors could be improved.
- The support of hw and advisement.

Section 3.4. Student Achievement and Recognition

All students that graduate with a major from the Department of Mathematics may receive department honors if they have a cumulative index of 3.2 or higher and a major course index of 3.5 or higher. The following 12 students received Mathematics Department honors at the latest Lehman commencement (2022):

- Esseh Alagah Komlavi
- Eric Aragundi
- Tulio Bautista
- Nil Dhar
- Julio Herrera Terrero
- Abdul D. Maradi
- Amal Miaoui-Bouazzouny
- Welayat Nasser
- Christal M. Perdomo
- Qamer Riaz
- Omar M. Simreen
- Cecilia Valdez

Additionally, the Math Department gives out four graduation prizes to its top graduates at the end of each academic year. Two of the awards are in honor of former faculty. They are the Connor Lazarov Award for Excellence in Mathematics and the Abraham and Doreen Rose Award for Excellence in Mathematics. Each of these honors includes a certificate signed by the College President, College Provost, and Department Chair and a $100 cash prize. The other two awards are presented by the Pearson Publishing Company. Recipients of the Pearson Award for Excellence in Mathematics also receive a certificate signed by the College President, College Provost, and Department Chair. These awards also come with a $100 Amazon gift card.

Section 3.5. Undergraduate Student Advising

The Mathematics Department has one full-time administrative staff member who handles all undergraduate Mathematics advising responsibilities for the entire college. Note that prior to September 2021, this one individual was also responsible for doing Computer Science advising. However, after the development of a new Math Tutoring Center (see Section 3.7), there was a change and this staff member only advises for Mathematics.

The mathematics (and computer science) undergraduate adviser's duties span all of the following categories:

- Mathematics Placement
- Course Permissions
- General Department Course Advising
- Major/Minor Advising
- Declaration of Major/Minor
- Grade Resolution Issues (F, W, INC, etc)
- Transfer Credit Evaluation
- General Course Related Issues

In sum, the adviser assisted 4,221 students during the 2021 calendar year. Of these 4,221 students, over 57% (2,422) needed help with math placement and course permissions. Roughly 17% (731) of all requests were for major advising and just over 18% (787) of all requests were related to course or other issues.

Prior to the COVID-19 pandemic, the Math adviser only worked with students in-person. Distance learning and the closure of campus during the pandemic forced all advising operations online. The adviser's transition was seamless; they immediately established an online form to collect information and to facilitate advising requests. The adviser also set-up virtual office hours for drop-in remote visits.

Even though the Math adviser is back on campus and available for in-person appointments, nearly all advising activity has remained virtual. Both the adviser and our students believe that the online advising environment is more efficient and better suited for student's busy commuter schedules. Additionally, the online request forms have better facilitated a fair and organized adviser workflow where important student data is retained.

Section 3.6. Graduate Student Advising

Two full-time Math faculty members (C. Cruz and B. Wynne) do all of the graduate-level advising for the Mathematics graduate programs. Dr. Wynne works exclusively with all Pure Math MA students and Dr. Cruz handles all issues related to Math Education graduate programs. Graduate advisers are responsible for the following:

- Program Recruitment
- Program Admissions Decisions
- Course Permissions
- General Program/Course Advising
- Qualifying Exam Organization
- Graduation Requirement Certification

In total, Lehman administration provides 6 teaching hours of reassigned time for Math to run its graduate programs. Usually, the Pure Math adviser receives 4 hours of reassigned time for the year and the Math Ed. Adviser receives 2 hours of reassigned time for the year. This is at the discretion of the Chair and mainly decided by program enrollments.

Section 3.7. Mathematics and Statistics Student Success (MS3) Center

In Fall, 2022 the Department of Mathematics launched a new one-stop shop to house all Mathematics and Statistics student success and support services. This space, called the Mathematics and Statistics Student Success (MS3) Center, replaced the previous Mathematics and Computer Science Learning Center. A separate center was also opened to handle Computer Science tutoring.

To build MS3, the Department of Mathematics presented the Lehman administration with a proposal outlining a 3-year plan to reimagine student support in Mathematics and Statistics. Briefly, the proposal charged MS3 with successfully implementing each of the following within 3 years of operation:

- Fall/Spring tutoring and support for gateway Mathematics courses (MAT 108, 126, 132, 171, 172, 175, and 176).
- Supporting 200+ level MAT course students with undergraduate learning assistants and embedded tutors by instructor request.
- Technology enhanced labs for students to complete coursework in real-time with content support specialists available.
- Intersession workshops to decrease DWIF grades and better prepare students for continued Math study.
- Hyflex workshops to service quantitative topics covered across STEM disciplines.
- Special events/presentations/workshops to showcase/support career opportunities in the Mathematical Sciences.
- General population MAT-course advising and placement.
- Offering a secure testing center for fully online MAT courses and students needing to complete make-up exams in in-person courses.

To oversee the center's day-to-day activities, the undergraduate Mathematics and Computer Science adviser was "promoted" to MS3 Director. This individual retained all Mathematics advising responsibilities, but was relieved of all Computer Science advising responsibilities. In addition, an Assistant Director was hired. The Assistant Director reports directly to the Director; they assist in the running of the Center each day and also help with advising duties during times of peak advisement activity.

Even though the MS3 Center has only been open for 3 months, it has been incredibly productive. In total, about 1035 students have used the MS3 resources in the first 10 weeks of class. Of this total, roughly 32% (326) have come to the center with homework related issues. This includes

needing a space to complete their homework and/or get help with homework-related content. Just under 8% (76) of the 1035 total student visitors utilized MS3 to get help using/registering for their required online homework software platform.

MS3 has also established a model to serve as a test-taking center for online, hybrid, and large-lecture mathematics courses. By working directly with some course instructors, the MS3 Center has provided over 550 students with a secure testing site. The plan is to have the MS3 Center host all exams for all online classes that require in-person testing. This will help the Department maintain academic integrity in key gateway courses, while also providing local students with a fully asynchronous online option.

Aside from tutoring and testing, MS3 has also made great progress in its other charges. The center has already hosted 6 hyflex math content workshops: 3 in Precalculus and 3 in Intro Statistics. The center has also run a enrichment workshop with Berkshire Hathaway Specialty Insurance Group targeted at students interested in Actuarial Science. Additional hyflex workshops are in the works for finals week and a follow-up “hands-on” Spring workshop with Berkshire Hathaway is in the works.

It is most exciting that the MS3 Center has secured over $200,000 worth of funding to support Winter/Summer session workshops, the hiring of tutors for the Spring semester, and a complete redesign of the existing center space to more effectively serve our students. Technology and equipment to fill the renovated space has already been ordered. Construction is expected to begin on January 3rd, 2023 and should be complete by the end of the Spring 2023 term.

Chapter 4: Faculty and Staff

Section 4.1. Full-Time Faculty

At present, the Department of Mathematics has 18 full-time faculty members. Table 4.1 below shows a listing of these faculty members along with their rank, degree information, and research interests. Among our faculty there are 8 full professors, 2 Associate Professors, 5 Assistant Professors, and 3 Lecturers. Note that at CUNY, the lecturer line is a full-time tenure-equivalent-track line. All full and associate professors in our department have tenure, and all assistant professors and lecturers are currently untenured.

All Mathematics Department faculty are engaged scholars; many attend and organize local, national, and international workshops, seminars, and conferences within their fields of interest. Eight of our faculty members also hold dual appointments within the CUNY system, one at Lehman College and one at the CUNY Graduate Center. At the Graduate Center, faculty can mentor doctoral students, teach doctoral level courses, and run weekly student/faculty seminars.

Name	Rank	Degree Information	Research Interests
Allen, Brian	Assistant Professor	PhD, University of Tennessee	Geometric Analysis, Metric Geometry, General Relativity
Behrstock, Jason	Professor	PhD, SUNY Stony Brook	Geometric Group Theory, Low Dimensional Topology
Bell, Renee	Assistant Professor	PhD, Massachusetts Institute of Technology	Galois Covers of Curves in Characteristic p, Fundamental Groups of Curves, Ramification Theory, Abhyankhar's Conjectures
Bettiol, Renato	Assistant Professor	PhD, University of Notre Dame	Geometric Analysis, Differential Geometry
Cruz, Celia	Lecturer	PhD, De La Salle University	Constructivism, Calculus, Best Teaching Practices
Fera, Joseph	Associate Professor	PhD, Wesleyan University	Hyperbolic Geometry, Complex Variables, Interdisciplinary Collaborations

Haxhoviq, Tanja	Lecturer	M.Phil, City University of New York	Number Theory, Combinatorics
Johnson, Kevin	Lecturer	MA, Lehman College	Number Theory, Combinatorics, Mathematics Education
Karp, Leon	Professor	PhD, New York University	Analysis, Differential Equations, Differential Geometry
Lakic, Nikola	Professor	PhD, City University of New York	Hyperbolic Geometry, Teichmuller Theory
Lin, Chen-Yun	Assistant Professor	PhD, Columbia University	Geometric Analysis, Spectral Geometry, Metric Geometry, Shape Analysis
Nathanson, Melvyn	Professor	PhD, University of Rochester	Algebra, Number Theory, Combinatorics
Owen, Megan	Associate Professor	PhD, Cornell University	Discrete Mathematical Biology, Geometric Statistics, Trees
Schneiderman, Rob	Professor	PhD, University of California, Berkeley	Geometric Topology
Sormani, Christina	Professor	PhD, New York University	Metric Geometry, Geometric Analysis, General Relativity
Szabo, Zoltan	Professor	PhD. University of Szeged	Differential Geometry, Geometric Spectral Theory, Mathematical Physics
Wynne, Brian	Assistant Professor	PhD, Wesleyan University	Model Theory
Zeinalian, Mahmoud	Professor	PhD, City University of New York	Topology, Geometry, Physics

Table 4.1. A listing of Math Department full-time faculty.

Faculty CVs appear in Appendix C. Please refer to these for full information about individual faculty members, their scholarship, and their service to the mathematics profession.

Section 4.2. Faculty Workload

Each academic year, full-time faculty are expected to teach 18 course hours. Since most mathematics courses are 4 credits, this amounts to just over a 2-2 teaching load per year. Faculty are encouraged to “bank” teaching hours in some semesters by slightly over teaching and then using these banked hours in subsequent semesters to teach less.

Faculty are compensated fractional teaching hours for conducting reading courses both at Lehman College and at the CUNY Graduate Center. This compensation is usually .25 credit hours

per independent study student. Additionally, if a research-active faculty member has an outside grant with substantial overhead, then they are awarded reassigned time from administration to lower their teaching load. In the past, research-active faculty without substantial grant funding received reassigned time too from administration in an effort to support scholarship. This support, however, has not been given in the past two years.

Section 4.3. Faculty Grant Activity

Since 2015, the mathematics faculty has collectively been awarded over 1.5 million dollars in grant funding. Awarding agencies and totaling amounts from these agencies are as follows:

- City University of New York $ 50,095
- National Science Foundation $ 1,251,720
- Simons Foundation $ 220,776

As mentioned in Section 4.2, faculty receiving grants with large overhead typically receive reassigned time from administration. The amount of reassigned time given, however, has varied significantly over time. Often, the reassigned time awarded for an outside grant is negotiated between the Dean, the faculty member, and sometimes the department Chair. The current Dean has attempted to codify reassigned time practices associated to outside grant funding. Still, it is unclear how much value the current upper-level administration places on research-based grants. Clear policies and statements of support and encouragement for research-based grants from upper-level administration would greatly benefit the program.

Section 4.4. New Mathematics Faculty and Support

Since the Fall 2018 semester, the Mathematics Department has hired 8 new full-time faculty members. Of these 8 positions, 5 have been replacement hires and 3 have been new faculty lines negotiated by department leadership on the basis of newly developed programs and cost-efficient course scheduling.

At CUNY, all new full-time untenured professorial line hires are given 18 hours of research reassigned time at the start of their contract. The expectation is that this time will be spent to reduce a junior faculty member's teaching load to help support their research agenda and boost productivity. New faculty members work with their department chairs to strategize how best to spend these 18 hours in the years preceding tenure.

This Fall 2021, the Math Chair established the position of "Mathematics Research Mentor" to help support the 5 untenured professorial line math faculty members. This research mentor is meant to be an additional resource for our junior faculty members to use as they ramp up their research activities at Lehman. Professor Christina Sormani has taken on the role for this academic year. In addition to working directly with faculty to support individual needs, Professor Sormani has also started a general advice column on her website to address basic questions all young researchers have. Topics included so far are:

- How to find mentors and collaborators in your field.
- How to present your research.
- Applying for external research funding.
- Teaching and supervising doctoral students.

Section 4.5. Part-Time Faculty

Nearly all introductory-level Mathematics courses at Lehman College are taught by part-time or adjunct faculty members. In recent semesters, The Math Department has about 30-35 adjunct instructors teaching. A majority of these adjuncts teach 2 courses, or 8 teaching hours per semester. A good number of these instructors are former Lehman students (indicated below with an *). Some are full-time secondary school educators at schools in the Bronx and work at Lehman to make extra money while also staying involved in the University setting. Here is a full listing of the Math Department's Fall 2021 part-time faculty members:

- Abi-Hanna, Rabab
- Bowman, Christopher*
- Caban, Vanesa*
- Chiem, Henry*

- Gaine, James*
- Ghajari, Farhad*
- Gonzalez, Rafael*
- Gruber, Gary
- Hellman, Johny
- Kelzougana, Souleymane*
- Leon, Handel
- Linton, Conrad*
- Mounsey, Mark
- Mujo, Julinda*
- Njoh, Linda
- Orlando, Ronald
- Ovadiah, Eduardo
- Pastor, Gabriel*
- Piotrowski, Sylvie*
- Quattromani, William
- Roff, Thyra
- Sanchez, Antonio*
- Shah, Samir
- Shiwmangal, Anthony*
- Teplitzsky, Martin
- Uddin, Nazeha*
- Valencia, Libardo*
- Veloz, Johnny
- Wu, Xiu*

Section 4.6. Department Staff

The Mathematics Department has 4 full-time staff members. These individuals, their official titles, and their functional tiles are shown in Table 4.3 below.

Name	Official Title	Functional Title
Bonilla, Myrsa	Administrative Assistant	Administrative Assistant
Florin, Marvin	Higher Education Officer Associate	Administrative Manager
Gonzalez, Rafael	Assistant to Higher Education Officer	Director: Mathematics and Statistics Student Success Center
Shiwmangal, Anthony	College Lab Technician	Assistant Director: Mathematics and Statistics Student Success Center

Table 4.3. A listing of Math Department full-time staff..

Chapter 5: A Look Back, A Plan Forward

Section 5.1. Department Self-Study 2011-2012

In 2014-2015, Lehman College experimented with a very corporate "prioritization" approach to institutional assessment based on Robert Dickeson's model in response to growing funding concerns. This document marks something much closer to the self-study process previously in use at the College. The last time the Department of Mathematics conducted such a self-study was in 2011-2012. See Appendix D for this report.

In the 2011-2012 report, Mathematics and Computer Science were housed in a single department: the Department of Mathematics and Computer Science. Collectively, there were 24 full time faculty members in the joint department, of which 9 were considered to be in Computer Science and 15 were considered to be in Mathematics. In what follows, we provide details about this previous report pertinent only to Mathematics; goals and priorities specific to Computer Science are omitted.

The department's mission and goals stated in the 2011-2012 self-study align nearly identically with the department's current mission and goals. Direct excerpts from this previous report are included below.

Department Mission

> *The mission of the department is threefold: to provide Lehman students with the skills necessary for quantitative and computationally assisted thinking and with the professional training and experience for STEM careers in industry, education, and government; to contribute to the world's body of knowledge through our scholarship; and to serve the community through advocacy for education and career preparation for women and minorities, training of teachers, and partnerships in industry.*

Teaching Goals

Our department teaching goals are to provide:

- *all students with the skills to obtain, analyze and draw conclusions from data; to develop abstract mathematical models needed to solve everyday problems; to use computers and computational tools effectively; and to think rigorously and reason abstractly.*
- *MAT (mathematics) majors with a solid grounding in algebra, analysis, geometry and probability/statistics.*
- *students in quantitative majors (e.g., Economics, Biology) with the foundational knowledge to use mathematics and computers effectively in research and coursework.*

Research Statement

The research of the mathematics faculty is broadly based in all major fields of mathematics and the faculty has won numerous awards. A fundamental goal is to hire a new generation of mathematicians to continue a legacy of outstanding research.

In September 2010, the Department had 4 different programs. These programs and their enrollments were as follows:

- Mathematics BA: 86 students enrolled
- Mathematics Minor: 15 students enrolled
- Mathematics MA: 8 students enrolled
- Teachers in Math MA: 71 students enrolled

The total student enrollment in department courses at this time was 3,530 students. Note, though, that this number *includes* student enrollments in all Computer Science courses.

The 2011-2012 self-study report indicates two key department challenges: lack of professorial contact and an aging faculty. Here are a few statements from the report highlighting these issues:

- *In MAT 132 (probability and statistics), the course taken by most of the college students to satisfy the College Math Requirement, 100% of the sections were taught by adjuncts*

and graduate students. It should be noted that when the department agreed to undertake the College Math Requirement, we were promised by Provost Wille that we would have enough full-time lines to staff at least half of the courses in the College Math Requirement. Among the goals of Lehman College Strategic Planning Council Report for 2009-2019, is raising the level of the Colleges mathematics requirement.

- *We need professorial faculty cognizant of advances in probability and statistics closely monitoring MAT 132.*

- *The Lehman College Strategic Planning Council Report for 2009-2019 expresses concern that at present 85 of Lehman's 373 full-time faculty are 65 years of age or older and 143 are 60 or over. In terms of percentages, 22.8% of the college's faculty are 65 or older and 38.3% are 60 or older.*

- *In our department, 8 out of 24 (33%) are 70 or older, 11 out of 24 (46%) are 65 or older and 16 out of 24 (67%) are 60 or older. The problems of large use of part time faculty will grow as these faculty leave.*

Much of the report includes goals specific to Computer Science, labs, and technology. The goals given in the 2011-2012 report relevant to the Math Department are:

- *Members of the P&B Committee feel that the department should split into separate mathematics and computer science departments.*

- *We would like to develop some calculus-based courses in the Mathematics of Finance. A topics course in this area was taught in Spring 2010 (and was very well received) but the faculty member who taught it resigned.*

- *In the light of all the talk (in Tweed, Albany and Washington) about getting better trained math teachers, we are planning on strengthening the courses and course requirements in the TMA (Math Teacher) program. Some courses are currently being tested in the NSF funded MTTI program and we are planning on introducing them to the TMA program.*

- *As CUNY enters its "Decade of Science" we would like to add Honors sections of our calculus courses and eventually, computer science.*

To address these challenges and meet these goals, the self-study requested additional faculty, staff, equipment, and lab space. Specifically, the report requests 4 professorial lines in mathematics. The professorial lines were not only requested to elevate the Math Department's research profile, but also to support curricular areas. More specifically, the report indicates Mathematical Finance, Statistics, and Math Teacher Education as in-need areas.

Section 5.2. Where We Are Now

Currently, the Department of Mathematics is in a good place with respect to all major areas of its mission: teaching, research, and school/community engagement. Since 2012, we have experienced growth in faculty, staff, student support services, curriculum, and student enrollment. The department has also taken many steps to address and (in some cases) meet challenges/goals presented in the 2011-2012 report. Advances in each of these areas is detailed below.

Faculty

Since 2012, the Mathematics Department has grown from 15 to 18 full-time faculty members. These hires have greatly changed the make-up of our department and greatly increased diversity within the department. With a full-time lecturer search currently underway, we expect to have 19 full-time faculty members by the beginning of the Fall 2023 semester. Hence, our department has increased its full-time faculty by over 25% in 10 years. In addition, 8 of our current 18 full-time faculty members are junior and without tenure.

These additions directly address the two department challenges presented in the 2011-2012 report, namely the lack of professorial support and an aging faculty. Still, our department is without a statistician. Given that Lehman is the only 4-year public institution serving the Bronx, a strong statistics and/or data-driven academic program should be available at the college. This coupled with a 40% increase in math-major enrollment demonstrates an additional need for research faculty.

Staff and Student Support Services

In the last 10 years, the Math Department has hired two full-time staff members dedicated solely to supporting student success. These individuals not only service all undergraduate mathematics advisement, but also oversee all tutoring services and academic support initiatives for our department. At the time of the last department review, undergraduate mathematics advisement was only done by faculty and mathematics tutoring services were housed in the same lab as computer science supports.

There has been a noticeable college investment in supporting mathematics instruction at Lehman by the College over the past 6 years. However, additional funding is always needed to offer good tutors a competitive wage. Currently, tutors make less than $15 per hour and can secure higher paying jobs elsewhere. Chapter 3 includes a comprehensive reporting of our department's current student support structure.

The Mathematics Department is also participating in many student outreach events. In addition to the efforts mentioned in Section 3.7, Professor Christina Sormani organizes the Inspiring Talks in Mathematics Series, a funded series of virtual talks for undergraduates by under-represented mathematicians. The speaker gives a talk about their research as a video (posted publicly on YouTube) followed by a discussion to inspire math majors to consider pursuing a doctorate. They are aimed at mathematics majors who have at most completed courses in vector calculus and linear algebra.

Curriculum

The 2011-2012 self-study includes several curriculum-related goals that have been met. A calculus-based Financial Mathematics course has been developed and approved by the CUNY Board of Trustees. This class (MAT 364) has run for the past 2 years; it is regularly offered in the Spring and Summer terms. Additionally, a full-time faculty member (Johnson) was hired to oversee our Introduction to Statistics (MAT 132) class. This class is no longer instructed solely by

adjunct faculty. The course is now regularly taught by several full-time faculty members including, Cruz, Fera, Lakic, and Johnson.

Two new programs were developed over the last 3 years: a minor in Statistics and a minor in Actuarial Mathematics. These programs are detailed in Section 2.3. They exemplify our department's strong commitment to its mission to provide Lehman students with a "quality mathematics education whereby they can learn and develop… skills they need to successfully pursue their individual course of study and become effective members of their greater communities." Additional research faculty in these areas or in closely related fields is needed, however, to further develop and support the success of these programs.

Due to many changes in the NY State Teacher Certification credentials, the Math Teacher (TMA) graduate program was closed. However, this program was replaced by the MA in Mathematics and Instruction. The Math Department also hired a full-time faculty member (C. Cruz) with doctoral credentials in Mathematics Education to oversee all Math Teacher programs and coordinate directly with the Math Education program in the Department of Middle and Highschool Education. With this leadership, math has retooled many of its math courses designed for teachers.

The expansion of curriculum and program offerings demonstrates the Mathematics Department's commitment to Lehman's 90x30 initiative (See Section 1.2). It also furthers the College's 2021 strategic plan envisioning Lehman as "a nationally recognized leader in educational attainment and the expansion of knowledge through innovative curriculum and pedagogy."

Student Enrollments

Compared to September 2010, student enrollments in all Math undergraduate programs are up. The average number of Math majors over the last 6 years has been 130, compared to only 86 in 2010. The average number of Math minors over the last 6 years has been 29, compared to only

15 in 2010. There has been similar growth with the MA in Pure Mathematics – a 6-year average of 16 students enrolled compared to only 8 in 2010.

As mentioned, the Math Teacher (TMA) program no longer exists. Its current replacement (Math and Instruction) has minimal to no enrollment at this time. Note that the TMA program had high enrollment (over 70 students) in 2010 mainly because Lehman College was a main hub for the NYC Math Teaching Fellows program at that time. While our department still services the Math Teaching Fellows program, a large majority of the participants teach grades 6-8 and these students enroll in Math Teacher Master's programs housed in the Department of Middle and Highschool Education. Therefore, these student enrollments do not appear under our department programs.

The 2011-2012 report indicates a September 2010 student enrollment number of 3530. This, however, includes enrollments in Computer Science courses. Still, math enrollments *alone* in Fall 2022 were just under 3000.

Department Infrastructure

A number of improvements have been made to the Math Department's spaces over the few years. The department office was modified to provide both Mathematics and Computer Science with their own independent offices. In these renovations, the furniture and office equipment were also replaced and updated.

Currently, there are many construction projects underway. The Mathematics and Statistics Student Success Center space is being completely reconstructed and outfitted with new technology and equipment. In total, this amounts to a project costing roughly $200,000. The space is expected to be fully complete by the end of the Spring 2023 term.

Lehman is also subsidizing the construction of a 3D printing lab for the Math Department. This project will enhance Professor Renato Bettiol's NSF CAREER award work. Once complete, the lab will be used to run applied Mathematics courses, house hyflex Department workshops and colloquium, facilitate cross-discipline collaborations, and foster community outreach efforts. The 3D printing lab is expected to be fully online by the beginning of the Fall 2023 semester.

Section 5.3. What Next?

The Department of Mathematics has experienced much growth and development over the last 10 years. With its splitting from Computer Science, Mathematics has been able to focus more on developing and innovating its own curriculum and programs. We have increased our faculty, expanded our student supports, and started to build effective resources for the Lehman community. We close with a collection of goals to help us continue this positive momentum and elevate our department's profile locally and nationally.

Faculty and Research Supports

1. Add at least 2 professorial lines in mathematics, specifically for the purposes of supporting existing emerging department programs and elevating the department's research profile.

2. Work with administration to establish clear policies on reassigned time for both grant-supported and non-grant-supported scholarly activities.

3. Continue the Mathematics Research Mentor program to support junior mathematics faculty as they track to tenure.

4. Establish and curate supports to help faculty at the Associate Professor rank track to promotion to Full professor.

Program Growth

1. Increase the number of Math majors by 25%. Currently, there are 103 math majors. In 2019, this number was significantly higher and we believe that the COVID-19 pandemic played a part in this decrease.

2. Increase the number of Math minors by 25%. The department has identified barriers in the minor requirements that unfairly make it more difficult for Computer Science students to minor in Mathematics. We plan to correct this issue, make it more equitable for Computer Science students to minor in math, and expect a large increase in declared Math minors shortly thereafter.

3. Register at least 35 students into the Actuarial Mathematics Minor. The Actuarial Math minor is relatively new. By advertising and holding special events on actuarial science, we plan to increase enrollment in this program.

4. Register at least 35 students into the Statistics Minor. The Statistics minor was just registered in Fall 2022. By advertising and holding special events on statistics and data science, we plan to increase enrollment in this program.

5. Double the number of MA Math students. Currently, there are 10 students registered in the MA Math program. Our department just developed a dual credit program allowing for undergraduate students to seamlessly move into a graduate program and use some of their advanced credits towards the MA degree. We believe this will significantly increase interest in our MA program.

6. Register at least 15 students in the MA in Math & Instruction program. The Math & Instruction program is designed for a very select audience – in-service high school math teachers seeking professional certification in a math-intensive program. As opposed to other math programs, Math & Instruction places more emphasis on mathematics content and less on pedagogy. A targeted advertisement campaign is needed and can help to increase program enrollments.

<u>Curriculum Development</u>

1. Develop an intermediate-level Statistics course that follows MAT 132: Introduction to Statistics. This class can serve as a bridge for students to enroll in and complete our Statistics minor.

2. Develop more course offerings in Applied Mathematics and/or Numerical Analysis.

3. Review and update the Calculus-sequence curriculum including the associated departmental final exams.

4. Explore the possibility of adding a concentration in Applied Mathematics for Math majors.

Mathematics and Statistics Student Success Center

1. Create and implement an undergraduate teacher assistant program to help students enrolled in 200+ level MAT courses required for the mathematics major.

2. Design and implement intercession workshops to help students prepare for upcoming MAT courses, ie. Calculus-prep and/or INC resolution workshops for gateway Math courses.

3. Run at least 2 events per semester for STEM students, specifically events which showcase possible employment options post-graduation.

4. Review the current MAT-course permission coding in CUNYFirst to better streamline student course enrollment.

Outreach

1. Improve ties with local schools and industry to improve undergraduate internship opportunities.

2. Develop a student-led math club and potentially plan trips to local undergraduate math conferences.

3. Encourage collaboration with other departments within Lehman, including (but not limited to) Physics, Biology, Chemistry, Sociology, and Computer Science.

4. Seek partnerships with Math Departments from across CUNY, especially with local community colleges to more effectively work with transfer students.

5. Improve communication with Lehman alumni who had strong ties to the Department of Mathematics in an effort to better serve and inform our current student body.

Appendix A

Select Introductory Level Math Course Uniform Syllabi

MAT 126: Quantitative Reasoning
Course Syllabus

General Information

MAT 126 Quantitative Reasoning *4 hours, 3 credits*. Survey of modern quantitative techniques in a variety of disciplines. Critical thinking and mathematical/quantitative literacy are emphasized.
Notes: This course satisfies the CUNY Pathways Quantitative Reasoning graduation requirement.

Grading Policy

Expectations: Students are expected to learn the mathematics covered in class and the mathematics in the textbook and other assigned reading. Completing homework is part of the learning experience. Students should review topics from prior courses as needed and, if needed, seek help from their instructor or the Math Lab.
Homework: Online homework using Pearson's MyLab will be assigned at the end of each lesson. Students will be required to complete these assignments as part of their final grade.
Final Grade Computation: Provided that you attend class *regularly* and *on time*, your final course grade will be calculated as follows:

Homework	20%
Quizzes	20%
Midterm Exam	30%
Final Exam	30%

Materials, Resources, and Accommodations

Textbook: Bennett & Briggs, *Using and Understanding Mathematics: A Quantitative Approach 8e (Custom Lehman Edition)*. Students MUST also have access to the accompanying homework software, MyLab. *Consult with your instructor before you purchase anything.*
Technology: Students can use a Scientific Calculator in class, on homework, on quizzes, and on exams.
Tutoring: Departmental tutoring is available in the Math Lab on the 2nd floor of Gillet Hall. *For updated information please visit the following website (http://www.lehman.edu/academics/math-lab.php)*
Accommodating Disabilities: Lehman College is committed to providing access to all programs and curricula to all students. Students with disabilities who may need classroom accommodations are encouraged to register with the Office of Disability Services. For more info, contact the Office of Student Disability Services, Shuster Hall, Room 238, 718-960-8441.

Course Objectives

At the end of the course, students will be able to

- Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.
- Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
- Represent quantitative problems expressed in natural language in suitable mathematical format.
- Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.
- Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.
- Apply mathematical methods to problems in other fields of study.

These objectives will be assessed on the midterm and final exams along with other important techniques

Last Updated: Fall, 2022

Course Topics

There is flexibility in the order and time allotted to each of the topics below, but all topics must be covered by the instructor and understood by the student. *Section numbers refer to the most RECENT edition of the text; consult with your instructor if you are using an older edition*.

Lesson 1: Introductions, MyLab, & What is QR?
Lesson 2: 3A – Percentages, Fractions, and Decimals
Lesson 3: 3A – Using Percentages
Lesson 4: 3B – Scientific Notation and Conversions
Lesson 5: 3C – Rounding and Error
Lesson 6: 3D – Using the Consumer Price Index
Lesson 7: 3E – Reading Tables and Paradoxes
Lesson 8: 4A – Managing Money Basics
Lesson 9: 4B – Simple and Compound Interest
Lesson 10: 4B – More on Compound Interest
Lesson 11: 4C – Savings Plan Formula
Lesson 12: 4D – Loan Payment Formula
Lesson 13: Catch-Up Day and Review
Lesson 14: Review for Midterm Exam
Lesson 15: Midterm Exam

Students who fail this exam should consult with their instructor and consider dropping the course.
Bring a copy of all of your quizzes and your midterm exam to this consultation.
Students can also consult the department adviser

Lesson 16: 5A – Fundamentals of Statistics
Lesson 17: 5C – Qualitative vs. Quantitative Data
Lesson 18: 5E – Correlation and Causality
Lesson 19: 6A – Characterizing Data
Lesson 20: 6B – Variation in Data
Lesson 21: 8A – Linear vs. Exponential
Lesson 22: 8B – Doubling Time and Half-Life
Lesson 23: 8C – Real Population Growth
Lesson 24: 9A – Functions
Lesson 25: 9B – Linear Functions
Lesson 26: 9C – Exponential Functions
Lesson 27: Catch-Up Day and Review
Lesson 28: Review for Final Exam

Exams: Uniform Midterm and Final Exams are given in this course. Samples will be made available to you in advance. Scientific Calculators are allowed on both exams.

Introduction to Statistics Syllabus

MAT132 Introduction to Statistics: 4 hours, 4 credits. Collection, plotting, and comparison of data sets, histograms, descriptive statistics, the frequency definition of probability, random experiments, random sampling, binomial and normal variables, confidence intervals and tests of hypotheses for binomial and normal parameters. Time permitting, additional topics chosen from tests for the difference of proportions or populations means, the Chi Square test, and regression analysis. Introduction to a computer statistical package.

Prerequisite: MAT 104 or placement by the Department of Mathematics.

Instructor: Your instructor will provide contact information, office hours, and meeting times for your section.

Grading Policy

Expectations Students are expected to learn both the material covered in class and the material in the textbook and other assigned reading. Completing homework is part of the learning experience. Students should review topics from prior courses as needed using old notes and books.

Homework Approximately four hours of homework will be assigned in each lesson as well as additional review assignments over weekends. Students are required to use the MyStatLab software to complete the homework.

Exams There will be two midterms, and a final exam during finals week.

Grades *Homework will be worth at least 15% of the student's overall grade and the uniform final exam will be worth at least 35% of the student's overall grade. The precise grading policy for your section will be distributed by your instructor.*

Materials, Resources, and Accommodating Disabilities

Textbook: Triola, *Elementary Statistics*, 13th edition, Pearson Publishing,
ISBN: 0134462459 or 978-0134462455

Tutoring Departmental tutoring is available in room 222 of Gillet Hall. For updated information please visit the following website (http://www.lehman.edu/academics/mathlab.php).

Accommodating Disabilities Lehman College is committed to providing access to all programs and curricula to all students. Students with disabilities who may need classroom accommodations are encourage to register with the Office of Student Disability Services. For more information, please contact the Office of Student Disability Services, Shuster Hall, Room 238, phone number 718-960-8841.

Course Objectives

At the end of the course students should be able to:

1. Know the difference between population and samples in an inferential study, compare and contrast different sampling methods

2. Categorize variables as either qualitative or quantitative, and discrete or continuous.
3. Get and interpret descriptive measures of univariate data sets for both samples and populations. Also, differentiate between a parameter and a statistic.
4. Recognize correlations between data sets using scatter diagrams; express linear correlations using least squares regression; determine the strength of the correlation via the correlation coefficient; awareness of lurking variables.
5. Be familiar with and use the basic definitions and rules of probability theory.
6. Recognize the features of a binomial experiment and apply the binomial probability distribution.
7. Recognize the features of a normal distribution and compute probabilities using the standard normal distribution.
8. Infer population parameters using sampling distributions and the Central Limit Theorem.
9. Limit the error of estimation by calculating confidence intervals.
10. Accept or reject a hypothesis by establishing a level of significance.

Course Calendar

Lesson 1 Statistical and Critical Thinking (Section 1-1)
Exercises p.9 #1-20

Lesson 2 Types of Data and Data Collection (Sections 1-2 and 1-3)
Exercises p.22 #5-8,13-15,29-32
Exercises p.32 #5-8,21-23

Lesson 3 Frequency Distributions and Histograms (Sections 2-1 and 2-2)
Exercises p.48 #1,4,5,6
Exercises p.55 #1-8

Lesson 4 Graphs That Enlighten and Graphs That Deceive (Section 2-3)
Exercises p.64 #1,2,18,19,20

Lesson 5 Scatterplots, Correlation, Regression (Section 2-4)
Exercises p.74 #1,2,4,6,10
Exercises p.482 #1,2,3,4
Exercises p.499 #1,3,4,5

Lesson 6 Measures of Center (Section 3-1)
Exercises p.91 #1-5,7,9,12,29,30

Lesson 7 Measures of Variation (Section 3-2)
Exercises p.107 #1-4,7,9,12,37,38

Lesson 8 Measures of Relative Standing and Boxplots (Section 3-3)
Exercises p.124 #1-4,31

Lesson 9 Basic Concepts of Probability (Section 4-1)
Exercises p.143 #1-23 odd, 27

Lesson 10 Addition Rule and Multiplication Rule (Section 4-2)
Exercises p.155 #1-4,9,11,21

Lesson 11 Complements, Conditional Probability, and Bayes' Theorem (Section 4-3)
Exercises p.166 #1-3,7,17-20

Lesson 12 Review for First Exam on 1-1 through 4-1

Lesson 13 First Exam

Lesson 14 Probability Distributions (Section 5-1)
Exercises p.195 #1-14

Lesson 15 Binomial Distributions (Section 5-2)
Exercises p.208 #1-4,21,23,25

Lesson 16 The Standard Normal Distribution (Section 6-1)
Exercises p.240 #1-19 odd,37

Lesson 17 Applications of Normal Distributions (Section 6-2)
Exercises p.250 #1-17 odd,23

Lesson 18 Sampling Distributions and Estimators (Section 6-3)
Exercises p.262 #1-6,11

Lesson 19 The Central Limit Theorem (Section 6-4)
Exercises p.272 #1-4,5,17

Lesson 20 Normal as Approximation to Binomial (Section 6-6)
Exercises p.289 #1-8

Lesson 21 Review for Second Exam on 5-1 through 6-6

Lesson 22 Second Exam

Lesson 23 Estimating a Population Proportion (Section 7-1)
Exercises p.311 #1-4,9,13,19

Lesson 24 Estimating a Population Mean and Variance (Sections 7-2 and 7-3)
Exercises p.327 #1-9,11
Exercises p.339 #1-4,9

Lesson 25 Basics of Hypothesis Testing (Section 8-1)
Exercises p.371 #1-4,7,8,11,12,15,16,27,28

Lesson 26 Testing a Claim About a Proportion (Section 8-2)
Exercises p.382 #1-4,13,14,19,27

Lesson 27 Testing a Claim About a Mean (Section 8-3)
Exercises p.396 #1-4,15,19

Lesson 28 Review for Final Exam

MAT 172: Precalculus Syllabus

General Information

MAT172 Precalculus: *4 hours,4 credits*. Polynomial, rational, logarithmic, and trigonometric functions, with applications to problems in mathematics and the sciences.

Prerequisite: A grade of C (or better) in MAT 104 or placement by the Department.

Notes: (1) Students may not receive credit for both MAT 171 and MAT 172. (2) MAT 172 is a prerequisite for MAT 175.

Students planning on taking MAT 174 should take MAT 171 instead of MAT 172.

Instructor: *Your instructor will provide contact information, office hours and meeting times for your section*

Grading Policy

Expectations: Students are expected to learn both the mathematics covered in class and the mathematics in the textbook and other assigned reading. Completing homework is part of the learning experience. Students should review topics from prior courses as needed and, if needed, go to their instructor's office hours, to the Math Lab or to problem sessions regularly.

Homework: Online homework using Pearson's MyLab will be assigned at the end of each lesson. Students will be required to complete these assignments as part of their final grade.

Grades: *Homework will be worth at least 15% of a student's final grade and the uniform final exam will be worth at least 35% of a student's final grade. Students must pass the department final exam to pass the course. The precise grading policy for your section will be distributed by your instructor.*

Materials, Resources, and Accommodating Disabilities

Textbook *Blitzer, Precalculus (Custom Lehman Version) Students will receive purchasing information on their first day of class.*

Technology: Students can use a Scientific Calculator in class and on homework. *Graphing Calculators not permitted.*

Tutoring: Departmental tutoring is available in the Math Lab on the 2nd floor of Gillet Hall Room 233. *For updated information please visit the following website (http://www.lehman.edu/academics/math-lab.php)*

Reserve: Selected books have been placed on reserve in the library.

Accommodating Disabilities: Lehman College is committed to providing access to all programs and curricula to all students. Students with disabilities who may need classroom accommodations are encouraged to register with the Office of Student Disability Services. For more info, contact the Office of Student Disability Services, Shuster Hall, Room 238, 718-960-8441.

Course Objectives

At the end of the course, students will be able to:

1. Graph linear, polynomial, trigonometric, exponential, and logarithmic equations. (a,b)
2. Identify equations for given graphs. (a,b,e)
3. Work with functions: inverting, composing, multiplying, and dividing. (a,b,e)
4. Represent and solve real-world problems requiring optimization of quadratic functions. (a,b,c)
5. Use the unit circle to determine the values of trigonometric functions. (b,e)
6. State and apply trigonometric identities. (b,e)
7. Represent and solve real-world problems involving exponential growth and decay. (b,c)

These objectives will be assessed on the final exam along with other important techniques.

Last Updated, Summer 2022

Course Topics

There is flexibility in the order and time allotted to each of the topics below, but all topics must be covered by the instructor and understood by the student. *Section numbers refer to the most RECENT edition of the text; consult with your instructor if you are using an older edition.*

Lesson 1: Chapter P – The Real Numbers, Inequalities, Absolute Value, Interval Notation
Lesson 2: 1.1 – Equations and Their Graphs
Lesson 3: 1.9 – Distance Formula and Circles
Lesson 4: 1.4, 1.5 – Linear Equations, Perpendicular, Parallel Lines
Lesson 5: 1.2, 1.3 – Function Evaluation, Algebra, and Difference Quotients
Lesson 6: 1.6, 1.7 – Transformation of Functions, Function Composition
Lesson 7: 1.8 – Inverse Functions
Lesson 8: Review for Exam 1
Lesson 9: Exam I

Students who fail this exam should consider dropping the course.
Please consult with your professor or a math advisor during office hours for more personalized advising.
Bring a copy of your exam and completed homework

Lesson 10: 2.2 – Quadratic Functions and Applications (See posted worksheet.)
Lesson 11 & 12: 2.3, 2.4, 2.5 – Polynomial Functions and Their Graphs
Lesson 13 & 14: 2.6 – Rational Functions
Lesson 15: 3.1 – Exponential Functions
Lesson 16 & 17: 3.2 – Introduction to Logarithms and Logarithmic Functions
Lesson 18: 3.3 – Exponential and Logarithmic Equations
Lesson 19: Review for Exam II
Lesson 20: Exam II

Students who fail both exams should probably drop the course.
Please consult with your professor or a math advisor for more personalized advising. Bring a copy of your exams and completed homework.

Lesson 21: 4.3 – Review of Right Triangle Trigonometry (specifically angles 45, 30, 60)
Lesson 22: 4.1, 4.2 – Radians and the Unit Circle
Lesson 23: 4.4 – Trig Functions of Any Angle
Lesson 24: 4.5, 4.6 – Graphs of Sine, Cosine, and other Trig Functions
Lesson 25: 5.1, 5.2 – Verifying Trig Identities, Sum and Difference Formulas (Including Proofs)
Lesson 26: 6.1, 6.2 – Law of Sines and Cosines
Lesson 27: 4.7 – Inverse Trig Functions
Lesson 28: Review for the Final

Final Exam: A Uniform Final Exam will be given to all sections of Precalculus during Finals Week covering the entire course especially topics needed in future courses. A sample final will be distributed. No calculators will be permitted on the final exam.

Department of Mathematics, Lehman College, City University of New York

MAT 175: Calculus I Syllabus

MAT175 Calculus I: *4 hours, 4 credits.* Differentiation of functions of one variable; applications to motion problems, maximum-minimum problems, curve sketching, and mean-value theorems, Riemann Sums and Fundamental Theorem of Calculus
Prerequisite: A grade of C (or better) in MAT 172 or placement by the department.
Corequisite: MAT 155 Calculus I Computer Laboratory

Instructor: *Your instructor will provide contact info, office hours and meeting times for your section.*

Grading Policy

Expectations: Students are expected to learn both the mathematics covered in class and the mathematics in the textbook and other assigned reading. Completing homework is part of the learning experience. Students should review topics from prior courses as needed using old notes and books.
Homework: Approximately four hours of homework will be assigned in each lesson as well as additional review assignments over weekends.
Exams: There will be regular quizzes, two midterms and a final exam during finals week. Students who do not pass the departmental final exam will not pass the course.
Grades: *The precise grading policy for your section will be distributed by your instructor.*

Materials, Resources and Accommodating Disabilities

Textbook: Briggs, et al. Calculus Early Transcendentals. (Custom Lehman Edition.) Consult with your instructor before purchasing anything, MyLab access may be required.
Tutoring: Departmental tutoring is available in Gillet Hall 233. *For updated information please visit the following website (http://www.lehman.edu/academics/math-lab.php)*
Reliable Web Resources: See https://www.lehman.edu/mathematics/calculus.php
Accommodating Disabilities: Lehman College is committed to providing access to all programs and curricula to all students. Students with disabilities who may need classroom accommodations are encouraged to register with the Office of Student Disability Services. For more info, please contact the Office of Student Disability Services, Shuster Hall, Room 238, phone number, 718-960-8441.

Course Objectives

At the end of the course students should be able to:

1. Evaluate limits (as part of Departmental Objectives in Mathematics a,b and e)
2. Prove basic theorems using limits of the difference equation (as part of a,b and f)
3. Differentiate algebraic and trigonometric functions using key theorems (a,b and e)
4. Find the tangent line to a given graph at a given point (as part of a,b and e)
5. Solve maximum and minimum problems using differentiation (as part of a,b,c and e)
6. Solve related rates problems (as part of a,b and c)
7. Apply methods of calculus to curve sketching (as part of a,b)
8. Antidifferentiation, Riemann Sums and Fundamental Theorem of Calculus (a,b, and e)

These objectives will be assessed on the final exam along with other important techniques.

Course Calendar

This course and its corequisite are carefully timed to match topics, so stay on schedule.

Lesson 1: Review Precalculus (Chapter 1)
Lesson 2: Limits (Section 2.2)
Lessons 3-4: Evaluating Limits, the Squeeze Theorem (2.3, 3.5) *including Three Special Limits*
Lesson 5: Continuity (2.6)
Lesson 6: Infinite Limits and Asymptotes (2.4, 2.6)
Lesson 7: Tangent Lines and Derivatives (3.1, 3.2)
Lesson 8: Basic Derivative Laws (3.3, 3.5)
Lesson 9: Velocity and Laws of Differentiation (3.3, 3.6)
Lesson 10: Product and Quotient Rules (3.4, 3.5. 3.6)
Lesson 11: Chain Rule (3.7, 3.9)
Lesson 12: Review for Exam I on 2.1-3.3:
Review all prior homework problems.
Lesson 13: Exam I
Students who do poorly on this exam should consider dropping this course and attending a class on precalculus before taking calculus. Please consult with your professor or math advisor for more personalized advice. Bring your exam and homework with you when seeking advice.

Lesson 14: Implicit Differentiation and Applications to Inverse Function Derivatives (3.8, 3.9, 3.10)
Lessons 15-16: Related Rates (3.11)
Lessons 17-18: Extrema, Mean Value Theorem, Increasing/Decreasing (4.1, 4.2)
Lesson 19: Concavity (4.3)
Lesson 20: Limits at infinity (2.5)
Curve sketching will be covered in MAT155
Lesson 21: Optimization (4.5)
Lesson 22: Review for Exam II on Chapters 3-4:
Review all prior homework problems.
Lesson 23: Exam II on Chapters 3-4
Lesson 24: Antiderivatives, Distance, Displacement, Average Velocity (4.9)
Lesson 25: Area,Riemann sums, definite integrals (5.1, 5.2)
Lesson 26: Fundamental Theorem of Calculus (5.3)
Lesson 27: Substitutions (5.5)
Lesson 28: Review for the final exam

Final Exam: The Final Exam will be given during Finals Week covering the entire course especially topics needed in future courses.

MAT 176: Calculus II Syllabus

MAT176 Calculus II: *4 hours, 4 credits.* Riemann sums, logarithmic and exponential functions, integration of functions, applications of the definite integral, including area, volume, and arc length, infinite series and power series in one variable.
Prerequisite: A grade of C (or better) in MAT 175 or placement by the department.
Corequisite: MAT 156 Calculus I Computer Laboratory

Instructor: *Your instructor will provide contact info, office hours and meeting times for your section.*

Grading Policy

Expectations: Students are expected to learn both the mathematics covered in class and the mathematics in the textbook and other assigned reading. Completing homework is part of the learning experience. Students should review topics from prior courses as needed using old notes and books.
Homework: Approximately four hours of homework will be assigned in each lesson as well as additional review assignments over weekends.
Exams: There will be regular quizzes, two midterms and a final exam during finals week. Students who do not pass the departmental final exam will not pass the course.
Grades: *The precise grading policy for your section will be distributed by your instructor.*

Materials, Resources and Accommodating Disabilities

Textbook: Briggs, et al. Calculus Early Transcendentals. (Custom Lehman Edition.) Consult with your instructor before purchasing anything, MyLab access may be required.
Tutoring: Departmental tutoring is available in Gillet Hall 233. *For updated information please visit the following website (http://www.lehman.edu/academics/math-lab.php)*
Reliable Web Resources: See https://www.lehman.edu/mathematics/calculus.php
Accommodating Disabilities: Lehman College is committed to providing access to all programs and curricula to all students. Students with disabilities who may need classroom accommodations are encouraged to register with the Office of Student Disability Services. For more info, please contact the Office of Student Disability Services, Shuster Hall, Room 238, phone number, 718-960-8441.

Course Objectives

At the end of the course students should be able to:

1. Find Integrals (as part of dept objectives a, b, & e)
2. Solve physics and geometric problems (a, b, c, & e)
3. State and apply the Fundamental Theorem of Calculus and Riemann Sums (b & e)
4. Compute Taylor series and verify convergence of power series (a & b)

These objectives will be assessed on the final exam along with other important techniques.

Course Calendar

This course and its corequisite are carefully timed to match topics, so stay on schedule.

Brief Review: Antiderivatives, Area, Riemann Sums, and Definite Integrals (Ch. 5)
Lesson 1: Fundamental Theorem of Calculus (5.3)
Lesson 2: Substitution (5.5)
Lesson 3: Logs and Inverse Trig Functions (7.1)
Lesson 4: Computation of Area (6.2)
Lesson 5: Volumes: Disk Method (6.3)
Lesson 6: Volumes: Shell Method, Arc Length, Surfaces of Revolution (6.4, 6.5, 6.6)
Lesson 7: Basic Integration Rules (8.1)
Lesson 8: Integration by Parts (8.2)
Lesson 9: Review for Exam I
Lesson 10: Exam I
Students who do poorly on this exam should consider dropping this course and attending a class on precalculus before taking calculus. Please consult with your professor or math advisor for more personalized advice. Bring your exam and homework with you when seeking advice.

Lesson 11: Trigonometric Integrals (8.3)
Lesson 12: Trigonometric Substitution (8.4)
Lesson 13: Partial Fractions (8.5)
Lesson 14: L'Hopital's Rule (4.7)
Lesson 15: Improper Integrals (8.9)
Lesson 16: Sequences and Infinite Series (10.2, 10.3)
Lesson 17: Divergence and Integral Tests for Infinite Series (10.4)
Lesson 18: Comparison of Series, Limit Comparison and Direct Comparison (10.5)
Lesson 19: Alternating Series (10.6)
Lesson 20: Ratio and Root Tests (10.7)
Lesson 21: Review For Exam II
Lesson 22: Exam II
Review all prior homework problems.

Lesson 23: Taylor Approximations (11.1)
Lesson 24: Power Series and Taylor Series (11.2, 11.3)
Lesson 25: Taylor Series Continued (11.4)
Lesson 26: Ordinary Differential Equations: Growth and Decay (9.1)
Lesson 27: Separation of Variables in Ordinary Differential Equations (9.3)
Lesson 28: Review for the final exam

Final Exam: The Final Exam will be given during Finals Week covering the entire course especially topics needed in future courses.

Department of Mathematics, Lehman College, City University of New York

Appendix B

Sample Mathematics Program Assessment Reports

Lehman College
Academic Program Assessment 2020-2021
Assessment Final Report
Math BA program

1. Using data from all sections of MAT226 and MAT320 over the academic year 2020-2021, our objective was to assess the following program goals:

   (a) Perform numeric and symbolic computations

   (b) Construct and apply symbolic and graphical representations of functions

   (c) Model real-life problems mathematically

   (d) State and apply mathematical definitions and theorems

   (e) Prove fundamental theorems

   (f) Construct and present a rigorous mathematical argument

2. Here are the learning objectives for MAT226 (with the corresponding program goals):

   (i) Graph and determine the equations for lines and planes (a,b)

   (ii) Compute sums, differences, dot products, and cross products of vectors (a)

   (iii) Determine velocities and accelerations of vector-valued position functions (a,b,c)

   (iv) Find level sets, gradients, and tangent planes to functions of several variables (a,b,d)

   (v) Apply the method of Lagrange Multipliers (a,b,c,d)

   (vi) Apply Fubini's Theorem and Green's Theorem to integrate functions and fields (a,b,d)

   The averaged data from the two sections (36 students total) of MAT226 in Fall 2020 is as follows:

Learning Objective	% success
(i)	74.81%
(ii)	73.61%
(iii)	79.47%
(iv)	73.10%
(v)	73.67%
(vi)	73.42%

   The averaged data from the two sections (46 students total) of MAT226 in Spring 2021 is as follows:

Learning Objective	% success
(i)	81.76%
(ii)	80.55%
(iii)	78.81%
(iv)	79.59%
(v)	73.67%
(vi)	73.42%

3. MAT320 does not have a uniform syllabus, so we map the program goals directly to problems on the final exam.

   The data from the Fall 2020 section of MAT320 (18 students) is as follows:

program goal	relevant final exam problem	% success
(a)	1d	78.94%
(b)	1a	94.73%
(d)	1e	73.68%
(e)	1g	21.05%
(d), (f)	2	47.36%
(f)	3	36.84%

   The data from the Spring 2021 section of MAT320 (14 students completed the course, 19 withdrew, 6 still have a grade of INC) is as follows:

relevant program goal	final exam problem	% success
(a), (d), (e), (f)	1	85.71%
(a), (b), (d), (e), (f)	2	78.57%
(a), (d), (f)	3	92.85%
(a), (b), (d)	4	85.71%

4. Conclusions

   - Report on Data Analysis/Assessment:
     - For MAT226, the target success rate of 70% was met or exceeded in all learning outcomes. This is a great result, especially considering the difficulties of the pandemic and online teaching. We will consider raising the target success rate for future assessment cycles.
     - In the spring 2021 section of MAT320, the target success rate of 80% was (essentially) met or exceeding in all areas. In the fall 2020 section of MAT320, the target success rate was essentially met in goal (a) and exceeded in goal (b), but not met in any of the other goals. The apparent disparity between the two sections is partially explained by the fact that a significant portion of the students in the spring section were given extra time to complete the course. Another factor is that the two instructors follow very different approaches to teaching, e.g., the fall 2020 instructor believes in giving very challenging exams and then curving the results. The downside of this approach, from the viewpoint of assessment, is that it makes it difficult to determine to what extent the students have achieved the desired learning goals.
   - Planned next steps:
     - If the current target is met or exceeded the next time we use MAT226 for assessment, we will consider raising the target.
     - In the future, when data from MAT320 is used for assessment, we will have to pay more careful attention to how the course is being taught, so that appropriate assessment measures can be devised.

- Planned assessment of the next steps:
  - We will continue to monitor the MAT226 assessment results.
  - The next time data from MAT320 is used for assessment, we will see whether similar disparities occur in the data from different sections.

Lehman College
Academic Program Assessment 2020-2021
Assessment Final Report
Pure Math MA program

1. Using data from the Comprehensive Exams given during the academic year 2020-2021, our objective was to assess the following program goals:

   (a) State definition and theorems precisely (not included since exams were given remotely)

   (b) Apply definitions and theorems to solve problems

   (c) Explain methods used and identify when such methods apply

   (d) Construct a logically sound argument to justify a claim

2. We mapped the program goals directly to problems on the exams.

   The data (for the 5 MA students that took the exam) from the Fall 2020 Algebra Comprehensive Exam is as follows:

program goal	relevant final exam problem	% success (5 students)
(b)	all problems	80%
(c)	1	82%
(d)	2a	85%

   The data (for the 5 MA students that took the exam) from the Spring 2021 Algebra Comprehensive Exam is as follows:

program goal	relevant final exam problem	% success (5 students)
(b)	all problems	83%
(c)	2b	86%
(d)	1a, 1e	90%

3. Conclusions

   - Report on Data Analysis/Assessment:
     - All students passed the exam (which is required for the MA degree), and most students showed mastery in all problems. However, these results may not be typical because the exam was administered remotely and extra time was given to accommodate student schedules during the pandemic. Also, this was only the second time the Pure Math MA program was assessed.
   - Planned next steps:
     - We will continue to build a history of assessment results for the Pure Math MA program and will compare how future in-person results compare with those
   - Planned assessment of the next steps:
     - After 2 more years of data collection, new targets and assessment methods will be devised.

Appendix C

Mathematics Faculty CVs

Brian Allen
Curriculum Vitae

CONTACT INFORMATION

Department of Mathematics
University of Hartford
200 Bloomfield Avenue
West Hartford, CT 06117

Email: brianallenmath@gmail.com
Email: brallen@hartford.edu
Website: sites.google.com/view/brian-allen

EDUCATION

Ph.D Mathematics, May 2016, University of Tennessee
Advisor: Dr. Alexandre S. Freire

M.S. Mathematics, May 2014, University of Tennessee

B.A. Mathematics, Minors in CS and Philosophy, May 2010, Messiah College

ACADEMIC POSITIONS

Assistant Professor (tenure track), CUNY Lehman College	Fall 2022 -
Assistant Professor (tenure track), University of Hartford	Fall 2019- Spring 2022
Assistant Professor, United States Military Academy	Fall 2016 - Spring 2019

RESEARCH INTERESTS

Geometric Analysis, Geometric Evolution Equations, Convergence of Riemannian Manifolds, PDE, and General Relativity

PUBLI -CATIONS

1. *Volume Above Distance Below*, **B. Allen**, R. Perales, and C. Sormani, arXiv:2003.01172 [math.MG] March 2, 2020 (To appear in the Journal of Differential Geometry)
2. *Inverse Mean Curvature Flow and the Stability of the Positive Mass Theorem*, **B. Allen**, arXiv:1807.08822 [math.DG] July 25, 2018 (To appear in Communications in Analysis and Geometry)
3. *Almost Non-Negative Scalar Curvature on Riemannian Manifolds Conformal to Tori*, **B. Allen**, Journal of Geometric Analysis, **31** (2021) 11190-11213
4. *Properties of the Null Distance and Spacetime Convergence*, **B. Allen** and A. Burtscher, International Mathematics Research Notices (2021)
5. *Relating Notions of Convergence in Geometric Analysis*, **B. Allen** and C. Sormani, Nonlinear Analysis **200** (2020)
6. *Contrasting Various Notions of Convergence in Geometric Analysis*, **B. Allen** and C. Sormani, Pacific Journal of Mathematics **303** no. 1 (2019) 1-46
7. *Sobolev Stability of the PMT and RPI using IMCF*, **B. Allen**, General Relativity and Gravitation (Editors Choice) **51** no. 5 (2019)
8. *Sobolev Bounds and Convergence of Riemannian Manifolds*, **B. Allen** and E. Bryden, Nonlinear Analysis **185** (2019) 142-169
9. *Warped Tori with Almost Non-Negative Scalar Curvature*, **B. Allen**, D. Parise, A. Payne, L. Vazquez and S. Wang, Geometriae Dedicata **200** no. 1 (2019) 153-171
10. *Stability of the PMT and RPI for Asymptotically Hyperbolic Manifolds Foliated by IMCF*, **B. Allen**, Journal of Mathematical Physics **59** no. 8 (2018)
11. *IMCF and the Stability of the PMT and RPI Under L^2 Convergence*, **B. Allen**, Annales Henri Poincaré **19** no. 4 (2018) 1283-1306

12. *Geometry of Statistical Target Detection*, W. Basener, **B. Allen** and K. Bretney, J. Applied Remote Sensing **11** (2017)

PREPRINTS

13. *Stability of the Positive Mass and Torus Rigidity Theorems under Integral Curvature Bounds*, **B. Allen**, E. Bryden, and D. Kazaras, arXiv:2210.04340 [math.DG] October 9, 2022
14. *Sobolev Inequalities and Convergence for Riemannian Manifolds and Distance Functions*, **B. Allen** and E. Bryden, arXiv:2112.05105 [math.DG] December 10, 2021 (Under review)
15. *From L^p Bounds to Gromov-Hausdorff Convergence of Riemannian Manifolds*, **B. Allen**, arXiv:2106.14231 [math.DG] June 27, 2021 (Under review)
16. *Intrinsic Flat Stability of Manifolds with Boundary where Volume Converges and Distance is Bounded Below*, **B. Allen** and R. Perales, arXiv:2006.13030 [math.DG] June 23, 2020 (Under review)

BOOK CHAPTER

Introducing Mean Curvature Flow, **B. Allen**, Mean Curvature Flow: Proceedings of the John H. Barrett Memorial Lectures held at the University of Tennessee, Knoxville, May 29-June 1, 2018, Edited by T. Bourni and M. Langford, Berlin, Boston: De Gruyter (2020) 1-25

TEACHING EXPERIENCE

Lehman College:

MAT 175 Calculus I	Fall 2022
MAT 176 Calculus II	Spring 2023

University of Hartford:

Introductory Analysis	Fall 2021
Introduction to Modern Algebra	Spring 2021, Spring 2022
Advanced Engineering Mathematics	Fall 2019, Spring 2020, Fall 2020, Spring 2021, Fall 2021
Independent Study: Metric Geometry	Fall 2020
Independent Study: ODE/PDE's in Biomedical Engineering	Spring 2020
Linear Algebra	Spring 2022
Differential Equations	Fall 2019, Summer 2020 (Online), Fall 2020 (Online), Summer 2021 (online)
Calculus II	Spring 2020

United States Military Academy:

Multivariable Calculus	Spring 2017, Spring 2019
Independent Study: Partial Differential Equations II	Spring 2019
Independent Study: Euclidean and Non-Euclidean Geometry	Spring 2019
Quantum Algorithms	Fall 2018
Mathematical Analysis	Spring 2018
Independent Study: General Relativity	Spring 2018
Partial Differential Equations	Fall 2017, Fall 2018
Single Variable Calculus	Summer 2017, Fall 2017, Summer 2018
Mathematical Modeling and Differential Equations	Fall 2016

University of Tennessee:

Calculus III	Fall 2015, Spring 2016
Flipped Classroom with heavy use of Mathematica	
Calculus I	Spring 2015
Calculus II	Summer 2014, Fall 2014
Basic Statistics	Summer 2013, Fall 2013
Precalculus	Fall 2012

Finite Math Summer 2011, Fall 2011, Spring 2012, Summer 2012, Spring 2014

Project Publications:
B. Allen and K. Hood (2017), "5-080-S-SpaceFlightRecolonize," https://www.simiode.org/resources/3546. *Implemented in Spring 2017*

S. Morse, B. Allen and S. Florkowski (2018), "6-026-S-IsleRoyaleModeling," https://www.simiode.org/resources/4766. *Implemented in Spring 2018*

Teaching Achievements:
Dorothy Eaves Graduate Teaching Award (Spring 2011)
Nominated by my peers and awarded by faculty after doing observations of my class

UNDERGRAD RESEARCH ADVISED

USMA Senior Thesis Projects Advised:
CDT Reilly Dosh, Topological Data Analysis Applied to Time-Series Data, Fall 2016 and Spring 2017, Co-advised with Dr. Dungan

CDT Zachary Riggenbach, Geometric Analysis Applied to the Physics of Micro-droplets, Fall 2017 and Spring 2018, Co-advised with MAJ Hood

USMA Modeling Competitions Advised:
SCUDEM Differential Equations Modeling Competition (Oct. 9-14, 2017)

MCM/ICM Modeling Competition (February 8-12 2018)

SERVICE

University of Hartford:
JMM 2022 AMS Special Session Co-organizer with Lan-Hsuan Huang (UConn) and Raquel Perales (UNAM)
Humanities Center Faculty Fellow Fall 2020-Spring 2021
Mathematics Curriculum Committee
Undergraduate Colloquium co-organizer
Math Major Advisor, 2 students
Calculus of Variations and Partial Differential Equations referee

United States Military Academy:
Problem of the Week co-organizer
Center for Faculty Development member
Pure and Applied Mathematics Quarterly referee
Undergraduate Research Seminar co-organizer

INVITED TALKS

Harmonic Functions, Integral Curvature Bounds, and Geometric Stability, JMM AMS Special Session on Geometric PDEs, January 2023

Title TBD, Fields Institute Low Regularity in Physics and Geometry seminar, December 14, 2022

Stability of the Positive Mass Theorem Under Integral Curvature Bounds, CUNY Geometric Analysis Seminar, September 15, 2022

Open Questions on Scalar Curvature and Convergence (Talk presented by Brian Allen on behalf of Christina Sormani), University of Tennessee Barrett Memorial Lectures, June 10, 2022

From Integral to Metric Geometry Notions of Convergence for Riemannian Mani-

folds, Lehman College Colloquium, February 8, 2022

From L^p Bounds to Metric Geometry Notions of Convergence for Riemannian Manifolds, CUHK Geometric Analysis Seminar, September 23, 2021

Bootstrapping From L^p Bounds to Metric Geometry Notions of Convergence, UConn PDE and Differential Geometry Seminar, September 13, 2021

L^p, Gromov-Hausdorff, and Sormani-Wenger Intrinsic Flat Convergence of Riemannian Manifolds, Sormani's Fourier Institute Team Seminar, August 6, 2021

How Should Sequences of Tori with Almost Non-Negative Scalar Curvature Converge?, CCSU Colloquium, October 9, 2020

Contrasting and Relating Notions of Convergence in Geometric Analysis, Virtual Workshop on Ricci and Scalar Curvature, August 2020

Null Distance and Convergence of Warped Product Spacetimes, Harvard CMSA General Relativity Seminar, April, 17, 2020

Properties of the Null Distance on a Spacetime, Union College Mathematics Conference, September, 14, 2019

Examples of Sequences of Manifolds and their Intrinsic Flat Limits, Filling Volumes, Geodesics, and Intrinsic Flat Convergence, Yale University, July 29-August 2, 2019

Contrasting Notions of Convergence for Sequences of Riemannian Manifolds, AMS Sectional Meeting, Hartford CT, April 13-14, 2019

Inverse Mean Curvature Flow, NYU Scalar Curvature Workshop, December 7, 2018

Applications of IMCF to General Relativity, Drexel University Colloquium, Oct 2018

Tori of Almost Non-Negative Scalar Curvature, IAS Emerging Topics Working Group on Scalar Curvature and Convergence, Oct 2018

Stability Questions and Convergence of Riemannian Manifolds, Binghamton Analysis Seminar, Oct 2018

Almost Non-Negative Scalar Curvature on Warped Tori, CUNY Geometric Analysis Day, July 2018

Using IMCF to show Stability of the PMT and RPI, University of Chicago Geometric Analysis Seminar, June 2018

Introducing Mean Curvature Flow, Barrett Lectures on Mean Curvature Flow, University of Tennessee, May 2018

Contrasting Various Notions of Convergence in Geometric Analysis Geometry Seminar, Dartmouth, NH, May 2018

Contrasting Various Notions of Convergence in Geometric Analysis, Rutgers Geometry/Topology Seminar, New Brunswick, NJ, April 24, 2018

Stability of the PMT and RPI using IMCF, Mass in General Relativity, Stony Brook, NY, March 2018

Contrasting Various Notions of Convergence in Geometric Analysis, University of Tennessee Geometric Analysis Seminar, March 2018

IMCF and the Stability of the PMT and RPI, AMS Special Session on Mathematical Relativity and Geometric Analysis, JMM, January 2018

L^2 Convergence vs Intrinsic Flat Convergence and Positive Scalar Curvature, CUNY Flat Convergence Workshop, June 2017

Non-Compact Solutions to IMCF, Fordham Analysis Seminar, April 19 2017

IMCF and the Stability of the Positive Mass Theorem, University of Tennessee PDE Seminar, March 30 2017

IMCF and the Stability of the Positive Mass Theorem, CUNY ADM Mass and F Conv Reading Seminar 2017, January 2017

Non-Compact Solutions to IMCF in Hyperbolic Space, CUNY Grad Center Geometric Analysis Seminar, Nov. 2016

Asymptotic Analysis of Non-Compact Inverse Mean Curvature Flow in Hyperbolic Space, MAA Contributed Paper Session on Geometry, JMM, Spring 2016

Non-Compact Inverse Mean Curvature Flow in Euclidean Space, Vanderbilt PDE Seminar, Fall 2015

On The Proof Of The Riemannian Penrose Inequality, Spring 2015, 100 years of General Relativity Workshop, Brandenburg an der Havel, Germany

References

Alexandre S. Freire, Associate Professor, University of Tennessee, afreire@utk.edu

Lan-Hsuan Huang, Professor, University of Connecticut, lan-hsuan.huang@uconn.edu

Christina Sormani, Professor, Lehman College/ CUNY Graduate Center, sormanic@gmail.com

Diana Thomas, Professor, United States Military Academy, Diana.Thomas@westpoint.edu

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Bronx, NY 10468

jason.behrstock@gmail.com
http://comet.lehman.cuny.edu/behrstock

Research Interest

Geometric group theory

Low dimensional geometry, topology, and dynamics

Geometry of non-positively curved spaces

Mapping class groups and Teichmüller space

Probabilistic combinatorics (esp. random graphs)

Education

Ph.D. in Mathematics, State University of New York at Stony Brook, May 2004.
Thesis Advisor: Yair Minsky

B.A. in Mathematics (with Honors), University of California at Berkeley, May 1998.

Appointments

Professor of Mathematics (With Tenure) Lehman College, CUNY	September 2018 – Present
Research Scholar (Simons Fellow) Barnard College, Columbia University	January 2022 – December 2022
Associate Professor of Mathematics (With Tenure) Lehman College, CUNY	January 2012 – August 2018
Research Member Mathematical Sciences Research Institute	August 2016 – December 2016
Research Scholar (Simons Fellow) Barnard College, Columbia University	September 2014 – August 2015
Assistant Professor of Mathematics Lehman College, CUNY	September 2008–December 2011
Doctoral Faculty Graduate Center, CUNY	May 2010–Present
Ritt Assistant Professor of Mathematics Columbia University	July 2007–August 2008
Postdoctoral General Member Mathematical Science Research Institute	August 2007–December 2007
Assistant Professor of Mathematics University of Utah	July 2005–June 2007
Assistant Professor of Mathematics Barnard College, Columbia University	July 2004–June 2005

Awards, Honors, and Grants

Simons Fellow in Mathematics (twice).

Fellow of the American Mathematical Society, inaugural class.

Alfred P. Sloan Research Fellowship.

Invited Plenary lecture to the American Mathematical Society.

Lehman College Faculty Recognition Award for Excellence in Research.

NSF research grants PI: DMS-0604524, DMS-0812513, DMS-1006219, DMS-1710890.

NSF grant PI: DMS-1040900 CBMS-NSF conference.

Feliks Gross Endowment Award for Outstanding Scholarly Achievement, CUNY Academy for the Humanities and Sciences.

PSC-CUNY research grants PI: 60051-39 40, 63089-00 41.

NSF grant co-PI: DMS-0501702, conference support.

Dorothy Pieper Merit Award for Outstanding Entering Doctoral Students.

Publications & Preprints

1. Asymptotic geometry of the mapping class group and Teichmüller Space.
SUNY Stony Brook Ph.D Dissertation.
2. Asymptotic geometry of the mapping class group and Teichmüller Space.
Geometry & Topology, vol. 10 (2006) 1523–1578.
3. Curve complexes and finite index subgroups of mapping class groups, with D. Margalit.
Geometriae Dedicata, vol. 118 (2006) 71–85.
4. Dimension and rank for mapping class groups, with Y. Minsky.
Annals of Mathematics, vol. 167, (2008), 1055–1077.
5. Quasi-isometric classification of graph manifolds, with W. Neumann.
Duke Mathematical Journal, vol. 141, (2008) 217–240.
6. Thick metric spaces, relative hyperbolicity, and quasi-isometric rigidity, with C. Druţu and L. Mosher.
Mathematische Annalen, vol. 344, (2009), 543–595.
7. Commensurability and QI classification of free products of finitely generated abelian groups, with T. Januszkiewicz and W. Neumann.
Proceedings of the American Mathematical Society, vol. 137, (2009) 811–813.
8. Geometry and rigidity of mapping class groups, with B. Kleiner, Y. Minsky, and L. Mosher.
Geometry & Topology, vol. 16 (2012) 781–888.
9. Growth of intersection numbers for free group automorphisms, with M. Bestvina and M. Clay.
Journal of Topology, vol. 3, (2010) 280–310.
10. Centroids and the Rapid Decay property for mapping class groups, with Y. Minsky.
Journal of the London Mathematical Society, vol. 84, (2011) 765–784.
11. Median structures on asymptotic cones and homomorphisms into mapping class groups, with C. Druţu and M. Sapir.
Proceedings of the London Mathematical Society, vol. 102, (2011) 503–554.

12. Quasi-isometric classification of high dimensional right angled Artin groups, with T. Januszkiewicz and W. Neumann.
Groups, Geometry, and Dynamics, vol. 4, (2010) 681–692.
13. Quasi-isometric classification of non-geometric 3–manifold groups, with W. Neumann.
Journal für die Reine und Angewandte Mathematik [Crelle's Journal], vol. 669, (2012) 101–120.
14. Divergence and quasimorphisms of right-angled Artin groups, with R. Charney.
Mathematische Annalen, vol. 352, Issue 2 (2012) 339–356.
15. Homomorphisms into mapping class groups. An addendum, with C. Druţu and M. Sapir.
Proceedings of the London Mathematical Society, vol. 102, (2011) 555–562.
16. Divergence, thick groups, and short conjugators, with C. Druţu.
Illinois Journal of Mathematics, vol. 58 (2014) 939–980.
17. Cubulated groups: thickness, relative hyperbolicity, and simplicial boundaries, with M. Hagen.
Groups, Geometry, and Dynamics, vol. 10 (2016) 649–707.
18. Higher dimensional divergence for mapping class groups, with C. Druţu.
Groups, Geometry, and Dynamics, vol. 13 (2019) 1035–1056.
19. Thickness, relative hyperbolicity, and randomness in Coxeter groups, with M. Hagen and A. Sisto, and an appendix written jointly with P.-E. Caprace.
Algebraic & Geometric Topology, vol. 17 (2017) 705–740.
20. Geometric Group Theory: an introduction
Introduction to Modern Mathematics. Vol. 33 of the Advanced Lectures in Mathematics series (2015) 115–134.
21. Hierarchically hyperbolic spaces I: curve complexes for cubical groups, with M. Hagen and A. Sisto.
Geometry & Topology, vol. 21 (2017) 1731–1804.
22. Combinatorial higher dimensional isoperimetry and divergence, with C. Druţu.
Journal of Topology & Analysis, vol. 11 (2019) 499–534.
23. Global Structural Properties of Random Graphs, with V. Falgas-Ravry, M. Hagen and T. Susse.
International Mathematics Research Notices, vol. 2018, no. 5 (2018) 1411–1441.
24. Hierarchically hyperbolic spaces II: Combination theorems and the distance formula, with M. Hagen and A. Sisto.
Pacific Journal of Mathematics, vol. 299 (2019) 257–338.
25. Asymptotic dimension and small-cancellation for hierarchically hyperbolic spaces and groups, with M. Hagen and A. Sisto.
Proceedings of the London Mathematical Society, vol. 114 (2017) 890–926.
26. Quasiflats in hierarchically hyperbolic spaces, with M. Hagen and A. Sisto.
Duke Mathematical Journal, vol. 170, (2021) 909–996.

27. Largest acylindrical actions and stability in hierarchically hyperbolic groups, with C. Abbott and M. Durham.
Transactions of the American Mathematical Society, vol. 8 (2021) 66–104.
28. A counterexample to questions about boundaries, stability, and commensurability.
Proceedings of Beyond Hyperbolicity, London Mathematical Society Lecture Note Series no. 454.
29. Conjugator lengths in hierarchically hyperbolic groups, with C. Abbott.
http://arXiv.org/abs/1808.09604
30. A combinatorial take on hierarchical hyperbolicity and applications to quotients of mapping class groups, with M. Hagen, A. Martin, and A. Sisto.
http://arXiv.org/abs/2005.00567
31. Square percolation and the threshold for quadratic divergence in random right-angled coxeter groups, with V. Falgas-Ravry and T. Susse.
Random Structures & Algorithms, vol. 60 (2022) 594–630.
32. Structure invariant properties of the hierarchically hyperbolic boundary, with C. Abbott and J. Russell.
https://arxiv.org/abs/2208.07930

Student theses supervised

Graduate

Harold Sultan. Ph. D. 2012, at Columbia University.
The asymptotic cone of Teichmüller space: tree-graded structure and divergence. Currently software engineer at Facebook.

Timothy Susse. Ph. D. 2014, at CUNY Graduate Center.
Stable commutator length and the geometry of 3*–manifolds.* Currently assistant professor at Bard College Simons Rock.

Ivan Levcovitz. Ph. D. 2018, at CUNY Graduate Center.
Divergence of CAT(0) cube complexes and Coxeter groups. Currently postdoctoral fellow at Tufts.

Jacob Russell. Ph. D. 2020, at CUNY Graduate Center.
Convexity and curvature in hierarchically hyperbolic spaces. Currently NSF postdoctoral fellow at Rice University.

Daniel Berlyne. Ph. D. 2021, at CUNY Graduate Center.
Hierarchical hyperbolicity of graph products and graph braid groups. Currently Heilbronn Fellow at University of Bristol, UK.

Hai Yu. Ph. D. candidate at CUNY Graduate Center.

Zhihao Mu. Ph. D. candidate at CUNY Graduate Center.

Carol Badre. Ph. D. candidate at CUNY Graduate Center.

Yushan Jiang. Ph. D. candidate at CUNY Graduate Center.

Undergraduate honors theses

So Eun Park. Columbia University. 2009.
Symmetries of the Tower of Hanoi. **American Mathematical Monthly**, April 2010, and Undergraduate Honors Thesis.

Michael Rand. Columbia University. 2009.
On the Frame-Stewart algorithm for the Tower of Hanoi.

Mark Davis. Lehman Scholars Program CUNY. 2013. *Topological Classification of Surfaces.*

Rylee Lyman. Columbia University. 2015.
Algorithmic computation of thickness in right-angled Coxeter groups.

Selected Lectures (from over 150)

Invited Plenary Conference and Colloquia Lectures

1, 2, 3: Curves, Surfaces, and 3-Manifolds; Technion, Israel. Summer 2023.

Groups with Hyperbolic Features; ETH, Zurich, Switzerland. Fall 2019

Graduate school on Geometry of Teichmuller spaces; SUNY Stony Brook. Spring 2019

Nonpositively Curved Groups on the Mediterranean; Technion, Israel. Spring 2018.

Geometry of Teichmüller space and mapping class groups Conference; Warwick, UK. Spring 2018.

Geometry, Groups, and Dynamics (3 lectures); India. Fall 2017.

Colloquium; Vanderbilt. Fall 2017.

Geometric Groups in the Gulf; Florida. Spring 2017.

Non-Positive Curvature in Action; Newton Institute, Cambridge University, England. Spring 2017.

Probabilistic Methods in Topology; Centre de Recherches Mathématiques, Montréal, Canada. Fall 2016.

Beyond Hyperbolicity Conference; Cambridge University, England. Summer 2016.

Geometric and Asymptotic Group Theory with Applications; Stevens Institute of Technology. Summer 2016.

Colloquium; Warwick, England. Spring 2016.

Stanley Friedlander Colloquium; City University of New York. Spring 2016.

Workshop on Geometric Group Theory and Geometric Topology; University of Virgina. Fall 2015.

Théorie géométrique et asymptotique des groupes et applications; Centre International de Rencontres Mathématiques, Luminy, France. Fall 2015.

Groups and Geometry in the South East; Oxford, England. Summer 2015.

Topology; Oberwolfach, Germany. Spring 2015.

Teichmuller theory and surfaces in 3–manifolds Conference; Italy. Summer 2014.

Georgia Topology Conference. Summer 2014.

Surfaces in Sao Paolo; Brazil. Spring 2014.

Colloquium; University of Michigan. Fall 2013.

International Summer School on Modern Mathematics (5 lectures); Tsinghua University, Beijing, China. Summer 2013.

International Conference on Surveys of Modern Mathematics; Morningside Center of Mathematics, Chinese Academy of Sciences, Beijing, China. Summer 2013.

Coarse geometry of infinite groups; Université de Lille, France. Summer 2012.

Faces of geometry: 3-manifolds, groups and singularities; Columbia University, New York. Summer 2011.

Geometric Groups in the Gulf; Florida. Spring 2011.

Plenary lecture at AMS Southeastern Sectional Meeting, Spring 2011.

Conference on Geometric Group Theory; McGill University, Canada. Fall 2010.

Conference on Algebra and Algebraic Geometry with Applications: Celebration of the Eightieth Birthday of Professor Shreeram S. Abhyankar; Purdue University. Summer 2010.

Non-positive Curvature and Geometric Structures in Group Theory; Oberwolfach, Germany. Spring 2010.

Quasi-isometric rigidity in low dimensional topology; Banff International Research Station, Canada. Spring 2010.

Wasatch Topology Conference; Park City, Utah. Winter 2009.

Conference on Topology and Computers; Tokyo Institute of Technology, Japan. Summer 2009.

NSF-CBMS conference (Families of Riemann Surfaces and Weil-Petersson); Central Connecticut State University. Summer 2009.

Colloquium; Temple University, Pennsylvania. Spring 2009.

The 5th East Asian School of Knots and Related Topics; Gyeongju, Korea. Winter 2009.

Colloquium; University of California, Los Angeles. Fall 2008.

Colloquium; University of California, Davis. Fall 2008.

Colloquium; University of Muenster, Germany. Fall 2008

Geometric Group Theory, Geometric Analysis, and Mapping Class Groups; Johns Hopkins University, Maryland. Summer 2008.

Colloquium; Tufts University, Massachusetts. Spring 2008.

Colloquium; Tulane University, Louisiana. Spring 2008.

Colloquium; Lehman College, CUNY, New York. Fall 2007.

Research conference on geometric group theory; Mathematical Science Research Institute, Berkeley, California. Fall 2007.

Analysis on Homogeneous Spaces; University of Arizona. Spring 2007.

Topology; Banff International Research Station, Canada. Winter 2007.

Outre-espace et Espace de Teichmüller; Centre International de Rencontres Mathématiques, Luminy, France. Winter 2007.

Conference on Geometric Group Theory; Centre de Recherches Mathématiques, Montréal, Canada. Summer 2006.

Summer Research Program on Low Dimensional Topology; Park City Math Institute, Utah. Summer 2006.

Georgia Topology Conference; University of Georgia. Summer 2006.

Colloquium; Brigham Young University, Utah. Fall 2005.

Geometric and Asymptotic Methods in Group Theory; Banff International Research Station, Canada. Summer 2005.

Geometric Groups in the Gulf; Florida. Fall 2004.

Conference on Combinatorial Topology in Mapping Class Groups; University of Chicago. Spring 2004.

Invited Conference Sectional Lectures

Mathematical Congress of the Americas 2017, Special Section on Geometric group theory; Montréal, Canada. Summer 2017.

AMS Sectional Meeting, Special Section on Geometry of groups, surfaces and 3-manifolds; Rutgers University. Fall 2015.

AMS Sectional Meeting, Special Section on Geometric Group Theory and Topology; University of Alabama. Spring 2015.

AMS/MAA National Joint Meeting, Special Section on Geometric Group Theory; Baltimore, Maryland. Winter 2014.

Canadian Mathematical Society Sectional Meeting, Special Section on Geometric Group Theory and Low Dimensional Topology; Ottawa, Canada. Fall 2013.

AMS Sectional Meeting, Special Section on Geometric aspects of topology and group theory; Temple University. Fall 2013.

AMS Sectional Meeting, Special Section on Asymptotic Group Theory; University of Hawaii. Spring 2012.

AMS/MAA National Joint Meeting, Special Section on Hyperbolicity in manifolds and groups; Boston, Massachusetts. Winter 2012.

Spring Topology and Dynamics Conference; University of Florida (Section on Geometric Topology). Spring 2009.

Spring Topology and Dynamics Conference; University of Florida (Section on Geometric Group Theory). Spring 2009.

AMS/MAA National Joint Meeting, Special Section on Geometric Group Theory; New Orleans, Louisiana. Winter 2007.

AMS Sectional Meeting, Special Section on Low Dimensional Topology and Geometry; University of Utah. Fall 2006.

Combinatorial and Geometric Group Theory Conference; Vanderbilt, Tennessee. Summer 2006.

Spring Lecture Series; University of Arkansas. Spring 2006.

Spring Topology and Dynamics Conference; UNC Greensboro. Spring 2006.

Geometric and Probabilistic Methods in Group Theory and Dynamical Systems; Texas A&M, Texas. Fall 2005.

AMS Sectional Meeting, Special Section on Geometric Group Theory; Bard College, New York. Fall 2005.

Asymptotic and Probabilistic Methods in Geometric Group Theory; University of Geneva, Switzerland. Summer 2005.

Albany Group Theory Conference; New York. Fall 2004.

Albany Group Theory Conference; New York. Fall 2003.

Invited Seminar Lectures

Cambridge, UK; Geometric Group Theory Seminar. Fall 2022.

Rice University; Topology Seminar. Fall 2022.

Cornell University; Topology and Geometric Group Theory Seminar. Fall 2022.

University of Michigan; Topology Seminar. Fall 2022.

University of Muenster, Germany; Geometry/Topology Seminar (online). Spring 2021.

Ohio State University; Geometric Group Theory Seminar (online). Spring 2021.

Vanderbilt University; Topology and Group Theory Seminar. Fall 2019.

University of Toronto; Geometry & Topology Seminar. Spring 2019.

Princeton University; Topology Seminar. Fall 2018.

CUNY, Graduate Center; Magnus Seminar. Spring 2017.

University of Michigan; Geometry Seminar. Fall 2016.

McGill University, Canada; Topology Seminar. Spring 2016.

University of Utah; Max Dehn Seminar. Spring 2016.

Cornell University; Topology and Geometric Group Theory Seminar. Fall 2015.

CUNY, Graduate Center; Magnus Seminar. Fall 2015.

Oxford University, England; Topology Seminar. Spring 2015.

Vanderbilt University; Topology and Group Theory Seminar. Spring 2015.

CUNY, Graduate Center; Geometry/Topology Seminar. Spring 2015.

Temple University; Topology/Geometry Seminar. Spring 2015.

Yale University; Topology/Geometry Seminar. Spring 2015.

Tufts University; Geometric Group Theory and Topology Seminar. Fall 2014.

Seoul National University; Geometric Group Theory Seminar (3 lectures). Fall 2014.

Korea Advanced Institute of Science and Technology; Topology Seminar. Fall 2014.

Lafayette and Lehigh Colleges; Geometric Topology Seminar. Spring 2014.

Columbia University; Geometric Topology Seminar. Spring 2014.

Yale University; Topology/Geometry Seminar. Fall 2013.

CUNY, Graduate Center; Magnus Seminar. Fall 2013.

Temple University; Topology/Geometry Seminar. Spring 2013.

Yale University; Topology/Geometry Seminar. Spring 2012.

University of Maryland; Geometry and Topology Seminar. Fall 2011.

CUNY Graduate Center; Number Theory Seminar. Fall 2011.
SUNY Stony Brook; Topology and Geometry Seminar. Fall 2011.
Oxford University, England; Topology Seminar. Fall 2010.
Warwick University, England; Geometry and Topology Seminar. Fall 2010.
Vanderbilt University; Topology and Group Theory Seminar. Spring 2010.
Princeton University; Topology Seminar. Spring 2010.
Tufts University; Geometric Group Theory and Topology Seminar. Spring 2010.
Columbia University; Geometric Topology Seminar. Spring 2010.
University of Southern California; Geometry and Topology Seminar. Fall 2008.
University of Muenster, Germany; Geometry/Topology Seminar (3 Lectures). Fall 2008
CUNY, Graduate Center; Differential Geometry Seminar. Fall 2008.
Columbia University; Geometric Topology Seminar. Fall 2008.
Vanderbilt University; Noncommutative Geometry Seminar (2 lectures). Spring 2008.
Yale University; Topology Seminar. Spring 2008.
University of California, Davis; Geometry/Topology Seminar. Spring 2008.
Rutgers University, New Brunswick; Topology and Geometry Seminar. Fall 2007.
Columbia University; Geometric Topology Seminar. Fall 2007.
University of Pennsylvania; Geometry and Topology Seminar. Fall 2007.
Brown University; Geometry and Topology Seminar. Spring 2007.
Harvard University; Geometry and Dynamics Seminar. Spring 2007.
Tufts University; Geometric Group Theory and Topology Seminar. Spring 2007.
University of California, Berkeley; Topology Seminar. Spring 2007.
University of Southern California; Geometry and Topology Seminar. Fall 2006.
Princeton University; Topology Seminar. Fall 2006.
Vanderbilt University; Topology and Group Theory Seminar. Spring 2006.
University of Texas, Austin; Topology Seminar. Spring 2006.
Columbia University; Geometric Topology Seminar. Fall 2005.
Ohio State University; Geometric Group Theory Seminar. Fall 2005.
Cornell University; Topology and Geometric Group Theory Seminar. Fall 2005.
University of Utah; Max Dehn Seminar. Fall 2005.
Columbia University; Geometric Topology Seminar. Spring 2005.
CUNY, Graduate Center; Magnus Seminar. Fall 2004.
Cornell University; Topology and Geometric Group Theory Seminar. Fall 2004.
Rutgers University, New Brunswick; Topology and Geometry Seminar. Spring 2004.
University of Utah; Max Dehn Seminar. Spring 2004.
California Institute of Technology; Geometry and Topology Seminar. Fall 2003.
University of Chicago; Geometry and Topology Seminar. Fall 2003.
University of Illinois, Chicago; Geometry, Topology, and Dynamics Seminar. Fall 2003.

Columbia University; Geometric Topology Seminar. Fall 2003.

SUNY Stony Brook; Complex Analysis and Geometry Seminar. Fall 2002.

Teaching Experience

Graduate Center, CUNY

Topology; Topics in Geometric Group Theory; Introduction to Mapping Class Groups; Topics in Group Theory; Independent reading courses on "Mostow Rigidity," "Mapping Class Groups," "SCL" and other subjects.

Lehman College, CUNY

Topology; Abstract algebra; Linear Algebral; Honors courses on "The Shape of Space"; Multivariable Calculus; Calculus; Classical Geometry; etc. Reading courses: "topology of surfaces," "machine learning," etc.

Columbia University

Multivariable Calculus.

University of Utah

Trigonometry; Algebraic Topology; Point-set Topology; Honors Undergraduate Thesis; Undergraduate reading course on One-dimensional Dynamical Systems; Graduate reading course in Topology.

Barnard College

Calculus and Multivariable Calculus.

SUNY Stony Brook

Calculus; Mathematical Logic (Upper Division Math/Computer Science course).

Professional Activities

Ph.D. Advisor for Daniel Berlyne (CUNY Graduate Center, 2021), Jacob Russell (CUNY Graduate Center, 2020), Ivan Levcovitz (CUNY Graduate Center, 2018), Timothy Susse (CUNY Graduate Center, 2014), Harold Sultan (Columbia University, 2012).

Mentor for Carolyn Abbott (Ph.D. University of Wisconsin 2017) during extended visit to CUNY for 2015–2016 and 2016–2017 academic years.

Promotions and Budget Committee, Lehman College Department of Mathematics and Computer Science, 2010–2016. (Elected for two 3 year terms.)

Educational Policy Committee, Lehman College Department of Mathematics and Computer Science, 2012–2020. (Elected.)

Executive Committee, CUNY Graduate Center Department of Mathematics (elected). 2017–present.

Refereed for a number of journals, including: *Advances in Mathematics*, *Algebraic & Geometric Topology*, *American Mathematical Monthly*, *Commentarii Mathematici Helvetici*, *Compositio Mathematica*, *Crelle's Journal*, *Duke Mathematical Journal*, *Geometriae Dedicata*, *Geometric and Functional Analysis*, *Geometry & Topology*, *Groups, Geometry, and Dynamics*, *Illinois Journal of Mathematics*, *International*

Mathematics Research Notices, *International Journal of Algebra and Computation*, *Involve*, *Journal of the American Mathematical Society*, *Journal of the European Mathematical Society*, *Journal of IHES*, *Journal of the London Mathematical Society*, *Journal of Modern Dynamics*, *Journal of Topology*, *L'Enseignement Mathématique*, *Mathematical Research Letters Mathematische Annalen*, *Mathematische Zeitschrift*, *Michigan Mathematical Journal*, *New York Journal of Mathematics*, *Pacific Journal of Mathematics*, *Portugaliae Mathematica*, *Proceedings of the American Mathematical Society*, *Revista Colombiana de Matematicas*, *Transactions of the American Mathematical Society*, *Topology and its Applications*, etc.

University External Review Committee for Barnard College, Columbia 2017.

Grants reviews: NSF, NSA, Simons Foundation, misc European grants agencies.

Referee for CUNY University-wide award for scholarly achievement.

Regularly write letters of evaluation for promotions to Associate Professor and Full Professor.

Reviewer for *Math Reviews*.

Qualifying Exams Committee at CUNY Graduate Center, 2010–present

Strategic Plan for Research Committee, Lehman College, 2013–2014.

Calculus Committee, Mathematics Department, Lehman College, 2008–2013.

Assessment Committee, Lehman College, 2009–2010.

Initiated and organized the Geometry and Topology Seminar, CUNY Graduate Center, Fall 2008–present.

Co-organizer of "Advances in Hierarchical Hyperbolicity" at Banff Internation Research Station, 2023.

Co-organizer of "Reflections on Geometry: 3-Manifolds, Groups and Singularities – A Conference in Honor of Walter Neumann," at Barnard College, Columbia University, June 2022.

Co-organizer of Spring Topology & Dynamics Special Session on "Geometric Group Theory," March 2016.

Co-organizer of conference on "Mapping class groups and categorification," at Banff International Research Station, Canada, April 2013.

Member of scientific committee for "Young geometric group theory" international conference in Haifa, Israel, April 2013.

Organizer of CBMS–NSF Conference "3-Manifolds, Artin Groups, and Cubical Geometry," at CUNY Graduate Center, August 2011.

Co-organizer of "Faces of Geometry: 3-Manifolds, Groups and Singularities – A Conference in Honor of Walter Neumann," at Barnard College, Columbia University, June 2011.

Co-organizer of AMS Special Session on "Geometric Group Theory," at Georgia Southern University, March 2011.

Co-organizer of "Conference on Conformal Dynamics and Hyperbolic Geometry to celebrate the contributions of Linda Keen," at CUNY Graduate Center, 2010.

Co-organizer of conference on "Quasi-isometric rigidity in low dimensional topology," at Banff International Research Station, Canada, 2010.

Co-organizer of the Max Dehn Seminar, University of Utah, 2005–2007.

Co-organizer of "Braids, Links, and Mapping Class Groups," an international conference in honor of Joan Birman; 2005.

Co-organizer of the Geometric Topology Seminar, Columbia University, 2004–2005.

Co-organizer of the Complex Analysis and Geometry Seminar, SUNY Stony Brook, 2002–2003.

Co-organizer of the Dynamical Systems Seminar, UC Berkeley, 1996–1997.

Synergistic Activities

Ph.D. Thesis Committee Member for: Oussama Bensaid (Université de Paris, France, 2022), Harry Petyt (University of Bristol, UK, 2022), Daniel Berlyne (CUNY 2021), Bruno Robbio (University of the Basque Country, Spain, 2020), Jacob Russell (CUNY 2018), Saikat Das (Rutgers, 2019), Ivan Levcovitz (CUNY 2018), James Cornish (Columbia, 2018), Alexander Taam (CUNY, 2015), Chris Arettines (CUNY, 2015), Jingyin Huang (New York University, 2015), Corrin Clarkson (Columbia, 2014), Timothy Susse (CUNY, 2014), Harold Sultan (Columbia University, 2012), Mark Hagen (McGill, Canada, 2011).

Ph.D. Qualifying Exam Committee Member for: Alexander Stas (CUNY, 2018), Hai Yu (CUNY, 2018), Daniel White (CUNY, 2018), Daniel Berlyn (CUNY, 2017), Jacob Russell (CUNY, 2016), Matt Sunderland (CUNY, 2015), Ivan Levcovitz (CUNY, 2013), Robert Suzzi Valli (CUNY, 2011) Timothy Susse (CUNY, 2011), Harold Sultan (Columbia University, 2008).

Organized and ran Graduate reading courses for beginning and advanced students 2005 – present.

Undergraduate Honors Thesis Advisor for: Robert Lyman (Columbia University 2015), Mark Davis (Lehman College, 2013), Michael Rand (Columbia University, 2009), So Eun Park (Columbia University, 2009).

Organized and ran an NSF supported Research Experience for Undergraduates (REU) program at Columbia University on "Geometry of Coxeter groups" for 5 students, Summer 2014.

Organized and ran an NSF supported Research Experience for Undergraduates (REU) program at Columbia University on "The Tower of Hanoi" for 5 students, Summer 2008.

Organized and ran an NSF supported Research Experience for Undergraduates (REU) program at the University of Utah on "The Geometry of Mobius Transformations" for 8 students, Summer 2006.

Organizer of the Graduate Topology Seminar, University of Utah, 2006.

Recruitment of new incoming students (intended mathematics majors) for Barnard College, 2004–2005.

As a volunteer, taught Pre-Algebra to a group of inmates at San Quentin State Prison, California, who were working towards Associate in Arts degrees, 1997–1998.

Programming

Proficient in `C++` and Python. Developed software both for experimental mathematics and for computer assisted proofs, see e.g., http://comet.lehman.cuny.edu/behrstock/random.html

Other

Involved as a volunteer organizer for numerous community groups including: Juvenile Diabetes Research Foundation and Coalition for Safe Schools.
See: http://comet.lehman.cuny.edu/behrstock/personal.html

Renee Bell

Curriculum Vitae

City University of New York
Lehman College, Department of Mathematics
250 Bedford Park Blvd W
Bronx, NY, 10468, USA
renee.bell@lehman.cuny.edu

Employment

Assistant Professor, Lehman College, City University New York	Fall 2022-Present
Hans Rademacher Instructor, University of Pennsylvania	Fall 2018-Spring 2022
Postdoc, Université Paris-Sud	September 2019-August 2020

Education

B.A. Mathematics, University of California, Berkeley	May 2013
Ph. D. Mathematics, Massachusetts Institute of Technology	May 2018

Publications and preprints

Renee Bell, Paola Comparin, Jennifer Li, Alejandra Rincón-Hidalgo, Alessandra Sarti, Aline Zanardini. *Non-symplectic automorphisms of order multiple of seven on K3 surfaces.*, submitted, available at https://arxiv.org/abs/2204.05100

Renee Bell, Jeremy Booher, William Chen, Yuan Liu. *Tamely Ramified Covers of the Projective Line with Alternating and Symmetric Monodromy*, to appear in Algebra and Number Theory, available at https://arxiv.org/pdf/2007.12299

Renee Bell. *Local-to-Global Extensions to Wildly Ramified Covers of Curves*, available at arXiv:1710.09067

Renee Bell, Clifford Blakestad, Alina Carmen Cojocaru, Alexander Cowan, Nathan Jones, Vlad Matei, Geoffrey Smith and Isabel Vogt. *Constants in Titchmarsh divisor problems for elliptic curves*, Research in Number Theory **6** (2020)

Renee Bell, Ching-Wei Ho, and Robert Strichartz. *Energy Measures of Harmonic Functions on the Sierpinski Gasket*, Indiana Univ. Math. J. Volume 63 (2014), p. 831-868.

Conferences Organized

Southwest Center for Arithmetic Geometry, **Preliminary Arizona Winter School** (Joint with Isabel Vogt and Hang Ze) Fall 2022

AMS Mathematical Research Communities, **Explicit methods in arithmetic geometry in characteristic** p (Joint with Julia Hartmann, Valentijn Karemaker, Padmavathi Srinivasan, and Isabel Vogt) June 2019

Expository writing

Renee Bell, Borys Kadets, Padmavathi Srinivasan, Nicholas Triantafillou, and Isabel Vogt. *Practical suggestions for mathematical writing*, Notices Amer. Math. Soc., Volume 68 (2021), p. 930-934.

Renee Bell, Julia Hartmann, Valentijn Karemaker, Padmavathi Srinivasan, and Isabel Vogt. *Thinking positive: arithmetic geometry in characteristic p*, Notices Amer. Math. Soc., Volume 66 (2019), p. 239-241.

Talks

Tufts University - Algebra, Geometry, and Number Theory Seminar — December 2022
Title: *Monodromy of Tamely Ramified Covers of Curves*

University of Virginia Number Theory Seminar — November 2022
Title: *How do points on plane curves generate fields? Let me count the ways.*

Philadelphia Area Number Theory Seminar — September 2022
Title: *How do points on plane curves generate fields? Let me count the ways.*

Algebra 2022 and beyond : A conference in honor of the mathematical contributions of Michael J. Larsen — May 2022
Title: *Monodromy of Tamely Ramified Covers of Curves*

University of Georgia - Anabelian Days Down in Georgia — April 2022
Title: *Monodromy of Tamely Ramified Covers of Curves*

Rice University Algebraic Geometry and Number Theory Seminar — March 2022
Title: *Monodromy of Tamely Ramified Covers of Curves*

Korea Advanced Institute of Science and Technology — September 2021
Title: *Monodromy of Tamely Ramified Covers of Curves*

Pomona Research in Mathematics Experience — July 2021
Title: *Analogies Between Fields and Spaces: Galois Groups and Fundamental Groups*

Arizona Winter School — April-May 2021
Title: *Strange new landscape: an exploration of the p-adic numbers and modular forms*

Joint Math Meetings — January 2021
Title: *Tamely ramified covers of the projective line with alternating and symmetric monodromy.*

Penn Undergraduate Math Society — November 2020
Title: *RSA, NSA, FBI, BLM: Cryptography, number theory, and a back door*

Joint Math Meetings, Denver — January 2020
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

Séminaire Arithmétique et Géométrie Algébrique — September 2019
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

Philadelphia Undergraduate Mathematics Lecture Series — February 2019
Title: *Analogies Between Fields and Spaces: Galois Groups and Fundamental Groups*

UC Berkeley Arithmetic Geometry and Number Theory Seminar — November 2018
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

Northwestern Number Theory Seminar — October 2018
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

University of Wisconsin - Madison Number Theory Seminar October 2018
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

Emory Algebra and Number Theory Seminar September 2018
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

Harvard Number Theory Seminar November 2017
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

Georgia Tech Algebra Seminar November 2017
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

AMS Fall Southeastern Sectional Meeting September 2017
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

Summer Undergraduate Math Research at Yale July 2017
Title: *Analogies Between Fields and Spaces: Galois Groups and Fundamental Groups*

Algebraic Geometry Seminar at NYU April 2017
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

Baby Algebraic Geometry Seminar at Harvard April 2017
Title: *Local-to-Global Extensions for Galois Covers of Curves in Characteristic p*

University of Illinois at Chicago Number Theory Seminar November 2016
Title: *Galois Covers of Curves and Nonabelian Artin-Schreier Theory*

Pure Math Graduate Student Seminar at MIT April 2016
Title: *Complex Multiplication*

Seminar on Topics in Arithmetic, Geometry, Etc at MIT September 2015
Title: *Abelian Varieties over the Complex Numbers*

Seminar on Topics in Arithmetic, Geometry, Etc at MIT April 2015
Title: *Finite flat group schemes*

Kan seminar at MIT October 2014
Title: *The spectrum of an equivariant cohomology ring 1*

Seminar on Topics in Arithmetic, Geometry, Etc at MIT September 2014
Title: *Periods and Cohomology of Algebraic Varieties*

Kan seminar at MIT September 2014
Title: *Cohomologie modulo 2 des complexes d'Eilenberg Mac Lane*

2013 Joint Mathematics Meetings January 2013
Event: AMS Session on Undergraduate Research in Analysis

Student Algebraic Geometry Seminar at Berkeley November 2012
Title: *Cohomology of Conjugate Varieties*

Teaching and Mentoring Experience

Project leader for Pomona Research in Mathematics Experience Summer 2022
Led a research project for undergraduates from underrepresented groups and taught courses for mini-series to prepare them

Speaker for Arizona Winter School April-May 2021

Taught 6-week course for early graduate students and advanced undergraduates titled Strange new landscape: an exploration of the p-adic numbers and modular forms

Instructor for Math 170 at UPenn Spring 2021
Instructor for "ideas in mathematics" course, an introduction to mathematical ideas for non-math majors

Instructor for Math 503 at UPenn Spring 2021
Instructor for second-semester master's level abstract algebra

Instructor for Math 502 at UPenn Fall 2020
Instructor for master's level abstract algebra

Instructor for Math 499 at UPenn Fall 2019
Independent study course on elliptic curves

Instructor for Math 241 at UPenn Spring 2019
Taught partial differential equations for non-math majors

Instructor for Math 312 at UPenn Fall 2018-Spring 2019
Taught second-semester linear algebra for non-math majors

Teaching Assistant for 18.03 at MIT Spring 2018
Taught recitation for linear algebra and differential equations

Teaching Assistant for 18.02A at MIT Spring 2017
Taught recitation for an accelerated multivariable calculus class

Teaching Assistant for 18.01A at MIT Fall 2016
Taught recitation for an accelerated single-variable calculus class

Mentor for Directed Research Program at MIT January 2016
Led one-on-one reading courses for two undergraduate women

Research Mentor, MIT Summer Research Program, MIT Summer 2014
Mentored an undergraduate research project on representation theory

Mathematics Tutor, Disabled Students Program, UC Berkeley Spring 2012 – Spring 2013
Tutored disabled students in calculus

Counselor, Ross Mathematics Program, Ohio State University Summer 2011
Employer: Clay Mathematics Institute

UGSI, Suitcase Clinic, UC Berkeley Fall 2010
Trained volunteers for Suitcase Clinic, a student-run free clinic which provides services to homeless and low-income people in the Berkeley area

Teaching Assistant, Cal Teach Program Spring 2010
Assisted teacher Juliana Jones at Longfellow Middle School, a public school in Berkeley.

Selected Attended Conferences

Arizona Winter School: Perfectoid Spaces (University of Arizona) March 2017

Fundamental Groups in Arithmetic Geometry (Institut Henri Poincaré) May 2016

Workshop in Local-Global Principles and Their Obstructions (University of Pennsylvania) October 2015

AMS Summer Institute in Algebraic Geometry (University of Utah) July 2015

Awards

UPenn Math Department Teaching Award, Math 203 (Introduction to Proofs) Spring 2022

UPenn Math Department Teaching Award, Math 502 (Master's level algebra) Fall 2020

UPenn Math Department Teaching Award, Math 312 (Linear algebra) Fall 2018

MIT Dean's Fellowship Fall 2013

Highest Honors, UC Berkeley Department of Mathematics Spring 2013

Phi Beta Kappa 2012

Renato Ghini Bettiol

Curriculum vitae

CUNY Lehman College and Graduate Center
Department of Mathematics
http://www.lehman.edu/faculty/rbettiol
✉ r.bettiol@lehman.cuny.edu

Employment

2021 – present	Doctoral faculty member, City University of New York (CUNY), Graduate Center, New York, NY, USA
2018 – present	Tenure-track Assistant Professor, City University of New York (CUNY), Lehman College, Bronx, NY, USA
Summer 2019	Visiting scientist, Max Planck Institute for Mathematics, Bonn, Germany
2015 – 2018	Hans Rademacher Instructor of Mathematics, University of Pennsylvania, Philadelphia, PA, USA
Fall 2016	Postdoctoral fellow, Max Planck Institute for Mathematics, Bonn, Germany

Education

2015	Doctor of Philosophy (Ph.D.) in Mathematics, University of Notre Dame, USA
2012	Master of Science (M.Sc.) in Mathematics, University of Notre Dame, USA
2010	Master of Science (M.Sc.) in Mathematics, University of São Paulo, Brazil
2008	Bachelor of Science (B.Sc.) in Mathematics (with honors), University of São Paulo, Brazil

Research interests

Differential Geometry, Geometric Analysis, Partial Differential Equations

Grants

2022 – 2027	NSF CAREER: Curvature, Topology, and Geometric Partial Differential Equations, with new tools from Applied Mathematics (DMS-2142575, PI, $499,964)
2019 – 2022	NSF Geometric Analysis: New Perspectives on Four-Dimensional Geometry (DMS-1904342, PI, $220,855)
2019 – 2021	Fapesp SPRINT: Geometry and Dynamics between São Paulo and New York (2019/09045-3, co-PI, $20,000)
2019 – 2020	PSC-CUNY Research Award: Bifurcation and local rigidity in Geometric Variational Problems (PI, $3,500)
2016 – 2018	AMS-Simons Travel Grant (PI, $4,000)
Aug 2016	NSF Geometric Analysis: Smoky Great Plains Geometry Conference 2016 (DMS-1630367, co-PI, $39,812)
April 2013	NSF Geometric Analysis: Graduate Student Topology/Geometry Conference 2013 (DMS-1307681, $61,562)

Publications and Preprints

31. *Extremality and rigidity for scalar curvature in dimension four* (with M. Goodman)
submitted, arXiv:2205.00543

30. *Nonplanar minimal spheres in ellipsoids of revolution* (with P. Piccione)
submitted, arXiv:2111.14995

29. *Ricci flow does not preserve positive sectional curvature in dimension four* (with A. Krishnan)
Calc. Var. Partial Differential Equations, to appear, arXiv:2112.13291

28. *Geography of pinched four-manifolds* (with M. Kummer and R. Mendes)
Comm. Anal. Geom., to appear, arXiv:2106.02138

27. *Full Laplace spectrum of distance spheres in symmetric spaces of rank one* (with E. Lauret and P. Piccione)
Bull. Lond. Math. Soc. 54 (2022), no. 5, 1683–1704, arXiv:2012.02349

26. *Global bifurcation for a class of nonlinear ODEs* (with P. Piccione)
São Paulo J. Math. Sci. 16 (2022), no. 1, 486–507, MR 4426405, arXiv:2107.08181

25. *The first eigenvalue of a homogeneous CROSS* (with E. Lauret and P. Piccione)
J. Geom. Anal. 32 (2022), no. 3, Paper No. 76, MR 4363749, arXiv:2001.08471

24. *Subspace foliations and collapse of closed flat manifolds* (with A. Derdzinski, R. Mossa, and P. Piccione)
Math. Nachr., to appear, arXiv:2002.05757

23. *Sectional curvature and Weitzenböck formulae* (with R. Mendes)
Indiana Univ. Math. J. 71 (2022), no. 3, 1209–1242, MR 4448583, arXiv:1708.09033

22. *Convex algebraic geometry of curvature operators* (with M. Kummer and R. Mendes)
SIAM J. Appl. Algebra Geom. 5 (2021), no. 2, 220-228, MR 4252070, arXiv:1908.03713

21. *Nonuniqueness of conformal metrics with constant Q-curvature* (with P. Piccione and Y. Sire)
Int. Math. Res. Not. IMRN 2021, no. 9, 6967-6992, MR 4251294, arXiv:1806.01373

20. *Instability and bifurcation* (with P. Piccione)
Notices Amer. Math. Soc. 67 (2020), no. 11, 1679-1691, MR 4201907

19. *Four-dimensional cohomogeneity one Ricci flow and nonnegative sectional curvature* (with A. Krishnan)
Comm. Anal. Geom. 27 (2019), no. 3, 511-527, MR 4003002, arXiv:1606.00778

18. *Teichmüller theory and collapse of flat manifolds* (with P. Piccione and A. Derdzinski)
Ann. Mat. Pura Appl. (4) 197 (2018), no. 4, 1247-1268, MR 3829569, arXiv:1705.08431

17. *Infinitely many solutions to the Yamabe problem on noncompact manifolds* (with P. Piccione)
Ann. Inst. Fourier (Grenoble) 68 (2018), no. 2, 589-609, MR 3803113, arXiv:1603.07788

16. *Strongly positive curvature* (with R. Mendes)
Ann. Global Anal. Geom. 53 (2018), no. 3, 287-309, MR 3785699, arXiv:1403.2117

15. *Three-manifolds with many flat planes* (with B. Schmidt)
Trans. Amer. Math. Soc. 370 (2018), no. 1, 669-693. MR 3717993, arXiv:1407.4165

14. *Deformations of free boundary CMC hypersurfaces* (with P. Piccione and B. Santoro)
J. Geom. Anal. 27 (2017), no. 4, 3254-3284. MR 3708014, arXiv:1411.0354

13. *Strongly nonnegative curvature* (with R. Mendes)
Math. Ann. 368 (2017), no. 3-4, 971-986. MR 3673642, arXiv:1511.07899

12. *Four-dimensional manifolds with positive biorthogonal curvature*
Asian J. Math 21 (2017), no. 2, 391-396. MR 3672264, arXiv:1502.02270

11. *Delaunay-type hypersurfaces in cohomogeneity one manifolds* (with P. Piccione)
Int. Math. Res. Not. IMRN, 2016, no. 10, 3124-3162. MR 3551832, arXiv:1306.6043

10. *Bifurcation of periodic solutions to the singular Yamabe problem on spheres* (with P. Piccione and B. Santoro)
J. Differential Geom. 103 (2016), no. 2, 191-205. MR 3504948, arXiv:1401.7071

9. *Flag manifolds with strongly positive curvature* (with R. Mendes)
Math. Z. 280 (2015), no. 3-4, 1031-1046. MR 3369365, arXiv:1412.0039

8. *On the equivariant implicit function theorem with low regularity and applications to geometric variational problems* (with P. Piccione and G. Siciliano)
Proc. Edinb. Math. Soc. (2) 58 (2015), no. 1, 53-80. MR 3333978, arXiv:1009.5721

7. *Equivariant deformations of Hamiltonian stationary Lagrangian submanifolds* (with P. Piccione, B. Santoro)
Mat. Contemp. 43 (2014), 61-88. MR 3426257, arXiv:1302.6970

6. *Equivariant bifurcation in geometric variational problems* (with P. Piccione and G. Siciliano)
Progress in Nonlinear Differential Equations and Their Applications, Vol. 85 (2014), 103-133, Springer. MR 3330725, arXiv:1308.3268

5. *Deforming solutions of geometric variational problems with varying symmetry groups* (with P. Piccione and G. Siciliano)
Transform. Groups 19 (2014), no. 4, 941-968. MR 3278856, arXiv:1403.4275

4. *Positive biorthogonal curvature on $S^2 \times S^2$*
Proc. Amer. Math. Soc. 142 (2014), no. 12, 4341-4353. MR 3267002, arXiv:1210.0043

3. *Multiplicity of solutions to the Yamabe problem on collapsing Riemannian submersions* (with P. Piccione)
Pacific J. Math. 266 (2013), no. 1, 1-21. MR 3105774, arXiv:1304.5510

2. *Bifurcation and local rigidity of homogeneous solutions to the Yamabe problem on spheres* (with P. Piccione)
Calc. Var. Partial Differential Equations 47 (2013), no. 3-4, 789-807. MR 3070564, arXiv:1107.5335

1. *Genericity of nondegenerate geodesics with general boundary conditions* (with R. Giambò)
Topol. Methods in Nonlinear Anal. 35 (2010), no. 2, 339-365. MR 2676821, arXiv:0910.4175

Book

1. *Lie Groups and Geometric Aspects of Isometric Actions* (with M. Alexandrino), Springer, 2015. MR 3362465

Invited talks (last 5 years)

Oct 2022	Geometric Analysis: Past, Present and Future (YouTube). *Bifurcating minimal surfaces with symmetries*
Oct 2022	CUNY Graduate Center, Harmonic Analysis and PDE Seminar. *Nonuniqueness of solutions to the fractional Yamabe problem*
Jul 2022	University of Münster, Germany, Geometry Oberseminar. *Extremality and rigidity for scalar curvature in dimension 4*
Jun 2022	University of Parma, Italy, Geometry Seminar. *Convex Algebraic Geometry: Introduction and Applications*
Jun 2022	Convergence or Scalar Curvature Seminar (Zoom). *Extremality and rigidity for scalar curvature in dimension 4*
Apr 2022	Johns Hopkins University, Analysis and PDE Seminar. *Minimal 2-spheres in ellipsoids of revolution*
Mar 2022	University of Toronto, Geometry-Topology Seminar. *Bifurcating minimal 2-spheres in ellipsoids of revolution*
Feb 2022	Columbia University, Geometry & Analysis Seminar. *Four-dimensional Ricci flow and sectional curvature*
Nov 2021	Clark University (Zoom), Lefschetz Seminar. *Minimal 2-spheres in ellipsoids*
Nov 2021	University of California at Berkeley, Differential Geometry Seminar. *Sectional curvature bounds from the perspective of Convex Algebraic Geometry*
Sep 2021	III Encuentro Matemático del Caribe (Zoom), Plenary Talk. *Minimal 2-spheres in ellipsoids of revolution*
Sep 2021	3o Encontro em Geometria Diferencial no RS (Zoom). *Minimal spheres in ellipsoids of revolution*
Jul 2021	Mathematical Congress of the Americas (Zoom), Special Session. *Minimal 2-spheres in ellipsoids of revolution*
May 2021	University of Chicago (Zoom), Geometric Analysis Seminar. *Minimal 2-spheres in ellipsoids of revolution*
Apr 2021	Irish Geometry Seminar (Zoom). *Geography of pinched 4-manifolds*
Apr 2021	Montana State University, USA, Colloquium (Zoom). *Bifurcating minimal spheres in ellipsoids*
Mar 2021	Bronx Community College, Bronx, USA, S-STEM Seminar (Zoom). *How to recognize the shape of a world from within it?*
Mar 2021	AMS Spring Eastern Virtual Sectional Meeting, USA (Zoom). *Pinched 4-manifolds*
Mar 2021	University of Notre Dame, USA, Geometric Analysis Seminar (Zoom). *Geography of pinched 4-manifolds*
Feb 2021	Federal University of Ceará, Brazil, Geometry Seminar (Zoom). *Minimal 2-spheres in ellipsoids*
Dec 2020	University of Münster, Germany, Geometry Oberseminar (Zoom). *Pinched 4-manifolds*
Oct 2020	Virtual Seminar on Geometry with Symmetries (Zoom). *Minimal spheres in ellipsoids*
Oct 2020	Syracuse University, Geometric Analysis Seminar (Zoom). *Pinched 4-manifolds*
Oct 2020	Cornell University, Geometric Analysis Seminar (Zoom). *Pinched 4-manifolds*
Dec 2019	University of São Paulo, Brazil, Geometry Seminar. *Convex Algebraic Geometry of Curvature Operators*
Nov 2019	University of Pennsylvania, Philadelphia, USA, Geometry-Topology Seminar. *Convex Algebraic Geometry of Curvature Operators*
Oct 2019	Rutgers University, USA. Geometric Analysis Seminar. *Convex Algebraic Geometry of Curvature Operators*
Jul 2019	University of Münster, Germany, Workshop on Curvature and Global Shape. *Convex Algebraic Geometry of Curvature Operators*
Jun 2019	Universität zu Köln, Germany, Oberseminar Geometrie, Topologie, und Analysis. *Convex Algebraic Geometry of Curvature Operators*

Apr 2019 Institute for Advanced Study (IAS), Princeton, USA, Variational Methods in Geometry Seminar. *Bifurcating conformal metrics with constant Q-curvature*

Mar 2019 Chuo University, Tokyo, Japan, Geometric Analysis in Geometry and Topology (Minicourse with 4 lectures). *Bifurcation Theory in Geometric Analysis*

Dec 2018 University of Adelaide, Australia, AustMS (Plenary Talk). *How to find non-trivial solutions out of trivial ones*

Dec 2018 University of Adelaide, Australia, AustMS (Differential Geometry Session). *Convex Algebraic Geometry of Curvature Operators*

Dec 2018 AustMS Early Career Workshop, West Beach, Adelaide, Australia. *Exploring flat worlds*

Sep 2018 University of Regensburg, Germany, Conference on Analytical problems in conformal geometry and applications. *Non-uniqueness of conformal metrics with constant Q-curvature*

Sep 2018 University of Augsburg, Germany, Oberseminar Differentialgeometrie. *A Weitzenböck viewpoint on sectional curvature and applications*

Jul 2018 University of São Paulo, Brazil, Geometry Seminar. *A Weitzenböck viewpoint on sectional curvature and applications*

Feb 2018 University of California, San Diego, USA, Joint Geometry Seminar UCSD-UCI-UCR. *A Weitzenböck viewpoint on sectional curvature and applications*

Feb 2018 University of Kansas, USA, Colloquium. *Bifurcation Theory in Geometric Analysis*

Jan 2018 Université Catholique de Louvain, Belgium, Colloquium. *Bifurcation Theory in Geometric Analysis*

Jan 2018 CUNY (Lehman College), Bronx, USA, Colloquium. *Bifurcation Theory in Geometric Analysis*

Jan 2018 University of California, Riverside, USA, Colloquium. *Bifurcation Theory in Geometric Analysis*

Jan 2018 Joint Mathematics Meetings, Special Session on Nilpotent and Solvable Geometry, San Diego, USA. *Sectional curvature and Weitzenböck formulae*

PhD Students

present Aditya Kumar, Johns Hopkins University (co-advised with Yannick Sire)

Apr 2022 Sammy Sbiti, University of Pennsylvania (co-advised with Wolfgang Ziller)

Teaching and Advising experience

CUNY Lehman College

Fall 2022 Linear Algebra

Spring 2022 Probability

Fall 2021 Real Analysis

Spring 2021 Probability

Fall 2020 Real Analysis

Spring 2020 Vector Calculus; Probability

Fall 2019 Vector Calculus

Spring 2019 Calculus I; Calculus II

Fall 2018 Calculus I

University of Pennsylvania

Spring 2018 Calculus II; Differential Geometry

Fall 2017 Calculus II

Spring 2017 Calculus III; Topics in Riemannian Geometry (Graduate course)

Spring 2016 Linear Algebra II; Calculus I for the Wharton Business School - Active learning format, "flipped classroom"

Fall 2015 Introduction to PDEs/Calculus IV

Awards

2016 *Good Teaching Award*, Department of Mathematics, University of Pennsylvania

2012 *Striving for Excellence in Teaching*, Kaneb Center for Teaching and Learning, University of Notre Dame

Committee work and institutional service

CUNY

2020-present CUNY Lehman College Senate Representative for the Department of Mathematics

2019-present Chair of the Calculus Committee at Lehman College (Calculus coordinator)

2018-present Co-organizer of CUNY Geometric Analysis Seminar

University of Pennsylvania

2017-2018 Teaching Assistant Recruitment and Training Committees

2015-2017 Organizer of the Penn Graduate Student Geometry and Topology Seminar

2016-2017 Graduate Preliminary Exam Committee and Penn Math Club Committee

2015-2016 Penn Math Club Committee

Academic and professional service

Referee service (multiple times for certain journals/publishers)

Advances in Mathematics, Annali di Matematica Pura ed Applicata, Annals of Global Analysis and Geometry, Archiv der Mathematik, Birkhäuser, Bulletin of the London Mathematical Society, Boletín de la Sociedad Matemática Mexicana, Calculus of Variations and PDEs, Communications in Analysis and Geometry, Communications in Contemporary Mathematics, Compositio Mathematica, Contributions to Algebra and Geometry (Beiträge zur Algebra und Geometrie), CRC Press, Taylor & Francis Group, Differential Geometry and Applications, Documenta Mathematica, Geometric and Functional Analysis GAFA, Illinois Journal of Mathematics, Journal of Geometric Analysis, Journal of Geometry and Physics, Journal of Mathematical Physics, Journal of Topology and Analysis, Matematica Contemporanea, Mathematical Research Letters, Michigan Mathematical Journal, Nonlinear Analysis, Oxford University Press, Revista de la UMA, Science China Mathematics, Tohoku Mathematical Journal, Transactions of the AMS

Panel service

multiple years National Science Foundation, Division of Mathematical Sciences

Reviewer service

2015-present Mathematical Reviews (MathSciNet)

2011-present Zentralblatt Math (zbMATH)

Organization of events

2018 Co-organizer of the 33rd Annual Geometry Festival, in honor of Eugenio Calabi's 95th birthday, at the University of Pennsylvania, Philadelphia, PA, USA (with NSF support)

2016 Co-organizer of the 3rd Smoky Great Plains Geometry Conference, "Reflections on Global Riemannian Geometry", in honor of Karsten Grove's 70th birthday, in Townsend, TN, USA (with NSF support)

2013 Co-organizer of the 11th Graduate Student Geometry and Topology Conference (with NSF support)

Memberships

- American Mathematical Society (AMS), member since 2010
- Brazilian Mathematical Society (SBM), member since 2007
- National Alliance for Doctoral Studies in the Mathematical Sciences (Math Alliance), mentor since 2018

LEHMAN COLLEGE

CURRICULUM VITAE

Name: CELIA CRUZ Date Submitted: April 15, 2022

RECOMMENDATION FOR:

APPOINTMENT _____ PROMOTION _____

REAPPOINTMENT _____ REAPPOINTMENT WITH TENURE _____

OTHER (Sabbatical Leave, Designation ECP, etc.) _____

TITLE _____ DEPARTMENT_____

EFFECTIVE DATE _____ SALARY RATE _____

Initial Appointment Date _____ Tenure Date _____

HIGHER EDUCATION (in reverse chronological order)

Institution	Dates Attended	Degree & Major	Date Conferred
De La Salle University	1998-2002	PhD in Sci. Ed Major in Mathematics	Aug. 31, 2002
Lehman College	2009-2011	Graduate Certificate (MTTI Program)	June 2011
City University of New York	2010	Certificate of Completion (Math Leadership Institute)	June 2010
Philippine Normal University	1989-1993	MA Math Ed	March 27, 1996
Philippine Normal University	1988-1990	Certificate in Teaching	May 1990
Philippine Normal University	1985-1989	BS Mathematics	March 21, 1989

EXPERIENCE (in reverse chronological order)

A. Teaching (at Lehman and any other institutions)

Institution	Dates	Rank	Department
Lehman College	Jan 2019-present	Lecturer (Doctoral Schedule)	Mathematics
Lehman College	2015-present	Adjunct Assistant Professor	Mathematics/Middle and High School Education

Lehman College	Aug 2018- Dec 2018	Substitute Lecturer	Mathematics
Discovery High School	August 2010-August 2018	Mathematics Teacher Gr. 7-12	Mathematics
New Day Academy	August 2007-August 2010	Mathematics Teacher Gr. 7-12	Mathematics
Philippine Normal University	2006-2007	Full Professor	Mathematics
Philippine Normal University	2001-2006	Asso. Professor IV	Mathematics
Philippine Normal University	1997-2001	Asst. Professor I	Mathematics
Philippine Normal University	1989-1997	Instructor I	Mathematics

B. Employment/Others

Employer/ Institution	Dates	Position/ Rank	Department/Unit
Philippine Normal University	2002-2007	Coordinator (NGFF/PNU Scholarshp Program)	Mathematics
Philippine Normal University	2003-2006	Department Chair	Mathematics
Philippine Normal University	2002-2003	Coordinator	Mathematics
Far Eastern University	2006-2007	Adjunct Faculty	Education
Holy Angel University	2005-2006	Adjunct Faculty	Education
De La Salle University-CSB	1999	Adjunct Faculty	Mathematics
Philippine Normal University	1989-1990	Math Club Adviser	Mathematics

ACADEMIC AND PROFESSIONAL HONORS

(since last personnel action, with dates received, in reverse chronological order)

Master Teacher	Math for America	2013-2018
High Distinction, PhD	De La Salle University	2002
Magna Cum Laude, BS Math	Philippine Normal University	1989
Outstanding Dean's Lister	Philippine Normal University	1989
Salutatorian	SVSF High School	1985
Valedictorian	SVSF Elementary School	1981

PUBLICATIONS/CREATIVE WORKS

(since last personnel action, in reverse chronological order)

(not applicable)

PUBLICATIONS / CREATIVE WORKS
(prior to last personnel action, in reverse chronological order)

Peer-Reviewed
(2006) Modules in Science and Mathematics for Elementary Teachers. Science Education Institute and Advance Science and Technology Institute, Department of Science and Technology.ISBN: 9789718600313 (consultant/editor)

Cruz, C. (2006). Fractions. *Teaching Guide in Mathematics Elementary Level.* Philippine Normal University, Taft Ave. Manila. ISBN: 978-971-568-015-5

(2003) Teaching Guide in Secondary Mathematics. Philippine Normal University. (coordinator).

(2003). Teaching Guide in Secondary Mathematics: Teacher's Guide. Philippine Normal University. (coordinator).

Cruz, C. et. al. (1998). A Comprehensive Reviewer for Licensure Exam for Teachers (LET). Rex Book Store Inc. ISBN: 97123-24303

Cruz, Celia C (1996) Knowledge Competency Test in Math; Philippine Normal University, Sangguni, PNU Research Journal 1996

Cruz, C. (1995). QED Level 3.

Cruz, C. et. al. (1998). A Comprehensive Reviewer for Licensure Exam for Teachers (LET). Rex Book Store Inc. ISBN: 97123-24303

Non-Peer-Reviewed (not applicable**)**

PRESENTATIONS (since last personnel action, in reverse chronological order)

→ Co-presented an article on Exemplifying Differentiated Instruction to the Readers and Writers Group (RWG) of Lehman, February 16, 2021

PRESENTATIONS (prior to last personnel action, in reverse chronological order)

A. National

Cruz, Celia C. 2006. " Effects of a Constructivist Based Teaching Approach on Students' Conceptual Understanding of Introductory Calculus": MathTEd 10th Founding Year, International Conference – Ateneo de Manila University. October 23-25, 2006

Cruz, Celia C. 2006. " Problem Based Mathematics Learning": PATEF's Conference – February 17-18, 2006, Manila Pavilion. Theme: Educational Foundations Curriculum: Implications to Basic Education Curriculum

B. Regional and Local

Teacher Candidates Mathematics Content Specialty Test (CST) Support Year 2 (Lecturer) 2020
Teacher Candidates Mathematics Content Specialty Test (CST) Support Year 1 (Lecturer) 2019

Digging Deeper into Fraction Sub-Constructs and Processes: Professional Learning Team, Math for America, Workshop Series, February 2016 – June 2016

Fostering Student Engagement in High School Math: Solving Problems Systematically: MTTI Spring Workshop Series, Lehman College, March 2014

Cruz, Celia C. 2010. " Fractions...from Manipulatives to Conceptual Understanding". NYCMP 19th Annual Educator's Conference, May 1, 2010

Second Annual Leadership Conference, MTTI: Topic: A Model for Conceptual Understanding, March 20, 2010, Lehman College

Summer Sequential Certificate Program for Non-Major Teachers in Science and Mathematics 2005: Training Program. Philippine Normal University, Manila. April 25-May 18, 2005 (Lecturer- Coordinator)

Philippine Mathematics Framework for Basic and Teacher Education: UP NISMED. November 29, 2005 (Member of Core group and Writing Team)

Show and Tell: Session on Strategies: Philippine Normal University. December 11, 2004 (Demonstration Teacher)

Quadratic, Exponential and Logarithmic Functions, Arithmetic and Geometric Sequences; San Beda College Rizal campus. October 25-27, 2004 (Lecturer)

Summer Sequential Certificate Program for Non- Major Teachers in Science and Mathematics 2004: Philippine Normal University. April 12- May 3, 2004 (Coordinator/ Lecturer)

Seminar-Workshop on Improving Mathematics Education in Elementary and Secondary Schools through Remediation: Matain Elementary School, Subic, Zambales. February 21, 2004 (Resource Speaker)

Inter-University Math WHIZ 2004: Technological University of the Philippines. February 18, 2004 (Coach)

Addressing Demands of Teaching and Learning Mathematics in the New BEC: Philippine Normal University. May 5-7, 2003 (Coordinator/ Lecturer)

MTAP Math Count. UE Recto. Jan. 25, 2003 (Official Coach)

Concept Clarification and New Approaches/Strategies in Teaching Elementary Mathematics: Claret School of Quezon City. May 16, 2002 (Resource Speaker)

Intensive Training Program for Elem. Science and Math Teachers under Project RISE: DOST-RSTC- Philippine Normal University. April 10 – May 10, 2002 (Trainor)

Seminar Review in Basic Calculus: Philippine Normal University. April 4 – May 13, 1994 & April 22-27, 2002, April 23-28, 2001, April 10-15, 2000, April 4 – May 13, 1994 (Lecturer)

Seminar – Workshop on Updates in Sci. & Math: Philippine Normal University -Sarah Lee. April 2-4, 2001 (Trainor)

National Seminar-Workshop on Alternative Strategies in Teaching Math: Philippine Normal University. May 23-25 2000 (Lecturer/ Facilitator)

Intensive Training Program for Elem. Science and Math Teachers under Project RISE: DOST-RSTC- Philippine Normal University. April 24 – May 24, 2000 (Trainor/ Lecturer)

Training Program on Content Updates and Research in Science and Math Ed. Philippine Normal University. May 10-16, 1999 (Lecturer)

Crash Training Program for Secondary Sci. and Math Teachers under project RISE: DOST –SEI - Philippine Normal University. April 19, May 15, 1999, Nov.9 – Dec. 4, 1998 (Trainor)

Four-Week Teacher Training Course for Pakistani Educators: Philippine Normal University. Nov. 16 – Dec. 12, 1998 (Lecturer)

Content Updates and Teaching Strategies in Sci. and Math: Philippine Normal University. May 18-23, 1998 (Lecturer)

Certificate Program for Secondary School Sci. and Math Teachers under the Initiative of Cong. Wigberto E. Tañada: Philippine Normal University. April 14 – May 28, 1998 & April 14-May 27, 1997, April 10 – 30, 1996

May 6 – 25, 1996 (Trainor)

Seminar – Workshop on Updates in Teaching Math: Nasugbu, Batangas. May 15-16, 1998 (Resource Speaker)

PNU Review Classes for the Licensure Exam for Teachers: Philippine Normal University. 1996 – 2003. (Lecturer)

The 1997 National Seminar-Workshop on Upgrading Teaching Competencies in Math: IPG – Century Pak Hotel Mla. Feb. 7, 1997 (Resource Speaker)

Summer Sequential Certificate Program for Secondary School Sci. and Math Teachers: Philippine Normal University –DOST, April 15 – May 24, 1996 (Trainor)

First National Convention of the DOST- SEI PNU Scholar Graduates: DOST - Philippine Normal University. Jan. 13, 1996 (Facilitator)

Seminar-Workshop on Manipulative Models in Teaching Math: Philippine Normal University. May 22 – 24, 1995 (Trainor/ Lecturer)

PBET Review. Philippine Christian University. May 6, 1995 (Lecturer)

Tagis Talino ’95. Philippine Normal University. February 3, 1995 (Judge)

Philippine Statistics Quiz. Diliman QC. Nov. 16, 1994 (Official coach)

Try-Out of Instructional Materials for Math 3s and 4s (Secondary Math): Philippine Normal University. Aug. 2 – Oct. 6, 1994. (Lecturer)

Seminar on Strategies in teaching Math: Art Educ. Specialist - Philippine Normal University. Oct. 23-24, 1993 (Lecturer/ Demonstration teacher)

Seminar – Workshop in Teaching Math: Philippine Normal University. April 12-May 4, 1993 (Lecturer)

PH.D. DISSERTATION/THESIS TITLE:

Dissertation: *The Effects of the Constructive – Based Teaching Approach on Students' Conceptual Understanding of Introductory Calculus*

Thesis: *Development of a Knowledge Test for Mathematics Majors at Philippine Normal University*

UNPUBLISHED WORK

(Supported by evidence, including unpublished Ph.D. or Master's Thesis)

a. Works accepted for publication/Exhibition/Production

b. Works submitted for publication, exhibition and production

Cruz, C. et.al (2000) Evaluation of the BSE-Mathematics Program of PNU; De La Salle University, 2000

c. Works in progress

- Manuscripts in preparation

(w. Abi-Hanna) (2021) Exemplifying Differentiated Instruction: The Concept Attainment Models with Mathematics Teacher and Development (MTED)

- Research in progress – (not applicable)
- Exhibitions / Productions in preparation – (not applicable)

GRANTS

- Current

NOYCE Focus-on-STEM Co-PI (2021-2024)

- Completed

→ Math for America, Master Teacher Grant (2009-2011)
→ Mathematics Teacher Transformation Institute (MTTI) grant – NYC-DOE (2009-2011)
→ CHED-PNU Faculty Development Scholar, De La Salle University (1998-2002)
→ Helenica Foundation Book Scholar, De La Salle University (1998-2002)
→ College Entrance Scholar, Philippine Normal University (1985-1989)
→ Maharajah Scholarship Foundation scholar, SV-SF High School (1981-1985)

- Applied but not funded - **(**not applicable**)**

SERVICE TO DEPARTMENT

May 2021- May 2022

→ Served as MAT Advisor and Coordinator for Graduate Mathematics Education programs and the MA Math & Instruction program

- Granted permissions for MAT courses for both programs
- Interviewed potential applicants for MA Math & Instruction
- Advised candidates for MA Math & Instruction
- Coordinated the conduct of MAT Comprehensive exams for these programs
- Reviewed and recommended sub-plan changed forms for MSED MAT and MATINS candidates
- Continuously collaborated with math ed candidates and alumni by disseminating information re: Open Math Positions, Job offers, workshop opportunities , etc
- Co-facilitated Info Session for Graduate Math Ed (October 2021 and April 13, 2022)

→ Served as NYC Teaching Fellows/Collaborators co-adviser
- Advised Math Ed Teaching Fellows
- Participated in Meetings with DOE for Teaching Fellows

→ Served as Liaison for Algebra for All Program at Lehman
- In-charge of Cohort registrations and communicating with instructors
- Coordinating with CUNY CENTRAL on matters pertaining to tuitions, documentations for the A4A Teachers
- Advising A4A Teachers

→ Co-Coordinator for Graduate Math Ed programs at the MHSE/SOE/Lehman
- Interviewed new applicants for Math Ed programs, reviewed and approved their applications, advised them for enrollment
- Responded to math ed student emails, academic concerns, etc
- Conducted info sessions for math ed programs via Lehman
- Attended program coordinators' meetings, SOE and MHSE department meetings
- Prepared semestral schedule of math ed classes and assigned courses to instructors
- Co-coordinated the conduct of Comprehensive Examinations for Methods Courses in Math Ed Instructors
- Coordinated with the Lehman Graduation Specialist to review graduation applications of candidates in the MSED MAT and MATINS programs

→ Co-prepared proposal for Dual Certificate in Math Ed and Special Ed program for Grades 7-12
→ Participated in the planning of the proposed Elementary Math Specialist (TEAM) program
→ Participated in providing responses to NSF-NOYCE Focus-on-STEM proposal
→ Conducts interviews and information sessions for the NSF-NOYCE Focus-on-STEM applicants
→ Conducted formal classroom instructional observations of mathematics education adjunct faculty and mathematics faculty
→ Participated in EPC Meetings for Program and Curricular Changes/ Revisions
→ Participated in MHSE Department Meetings
→ Participated in Mathematics Department Meetings

May 2020 – May 2021

→ Co-prepared the ESC 789 program with Dr. Abi-Hanna

→ Served as NYC Teaching Fellows/Collaborators co-adviser

- Advised Math Ed Teaching Fellows
- Participated in Meetings with DOE for Teaching Fellows

→ Served as Liaison for Algebra for All Program at Lehman

- In-charge of Cohort registrations and communicating with instructors
- Coordinating with CUNY CENTRAL on matters pertaining to tuitions, documentations for the A4A Teachers
- Advising A4A Teachers

→ Co-Coordinator for Graduate Math Ed programs at the MHSE/SOE/Lehman

- Interviewed new applicants for Math Ed programs, reviewed and approved their applications, advised them for enrollment
- Responded to math ed student emails, academic concerns, etc
- Conducted info sessions for math ed programs via Lehman
- Attended program coordinators' meetings, SOE and MHSE department meetings
- Prepared semestral schedule of math ed classes and assigned courses to instructors
- Co-coordinated the conduct of Comprehensive Examinations for Methods Courses in Math Ed Instructors
- Coordinated with the Lehman Graduation Specialist to review graduation applications of candidates in the MSED MAT and MATINS programs

→ Co-Prepared and submitted the CAEP Accreditation documents for four different programs: the BA Math with Minor in Education, MSED MAT 5-9 Non-Math Majors, MSED MAT 7-12 for non-math majors, and MSED MAT 7-12 for math majors, all of which approved and recognized by CAEP in 2020.

→ Co-prepared proposal for Dual Certificate in Math Ed and Special Ed program for Grades 7-12

→ Participated in the planning of the proposed Elementary Math Specialist (TEAM) program

→ Participated in providing responses to NSF-NOYCE Focus-on-STEM proposal

→ Conducts interviews and information sessions for the NSF-NOYCE Focus-on-STEM applicants

→ Conducted formal classroom instructional observations of mathematics education adjunct faculty and mathematics faculty

→ Interviewed Potential Candidates for Adjunct Positions for Math Ed in MHSE

→ Participated in EPC Meetings for Program and Curricular Changes/ Revisions

→ Participated in MHSE Department Meetings

→ Participated in Mathematics Department Meetings

→ Conducted College Supervisions for Candidates in the Student Teaching and Internship Phase of their Math Ed program

→ Advised 31 students who completed their thesis and/or Research Projects

SERVICE TO SCHOOL

May 2021-April 2022

→ EPPC member of SOE to represent the Mathematics Department
→ Conducted CST Math 004 and CST Math Multi-Subject reviews for Special Ed, Childhood Education and Mathematics Education Students
→ Participated in SOE Program Coordinators' Regular Meetings
→ Co- Conducted Info Session NOYCE Focus-on-Stem Nov. 6, 2021 and April 1, 2022

May 2020-April 2021

→ Assume the role of EPPC member of SOE to represent the Mathematics Department (took over Brian Wynne's role upon his recommendation)
→ As coordinator, participated in the preparation of SOE CAEP Visit Documents
→ Participated in three CAEP Visit Interviews: EEPC, Faculty of Initial Programs and Student Support groups
→ Conducted CST Math 004 and CST Math Multi-Subject reviews for Special Ed, Childhood Education and Mathematics Education Students
→ Participated in meetings that involve planning, brainstorming of ideas and suggesting activities to promote anti-racism in education in general and at Lehman in particular through the SOE Anti-racism group

SERVICE TO LEHMAN COLLEGE

May 2021-April 2022

→ Reviewed proposed research by Lehman faculty and librarians as a of the Readers and Writers Group (RWG) of Lehman (May 2021 – present)
→ Represented Lehman in CUNY Information Sessions for Math Education programs
→ Co-PI, NOYCE Focus-on-STEM Scholarship Program for Year 2021- 2024

May 2020- April 2021
→ Reviewed proposed research by Lehman faculty and librarians as a of the Readers and Writers Group (RWG) of Lehman (May 2021 – present)
→ Co-presented an article on Exemplifying Differentiated Instruction to the Readers and Writers Group (RWG) of Lehman (2021)

SERVICE TO CUNY

May 2021-April 2022
→ Contributed Math CST Multi-subject review materials to the CUNY Teacher Education Website (NY State Teacher Certification Exams Preparation Resources for CUNY Teacher Education Candidates and Faculty)

→ Represented Lehman College to the CUNY A4A Information Sessions (Nov. 9, 2021)

May 2020-April 2021
→ Contributed Math CST 004 Review Materials to the CUNY Teacher Education Website (NY State Teacher Certification Exams Preparation Resources for CUNY Teacher Education Candidates and Faculty)

SERVICE TO THE PROFESSION

→ Reviewed an article about teaching Calculus for underrepresented students with the Journal for Multi-cultural Education (JME) (2021)
→ Reviewed an article on "Enacting ability grouping with elementary mathematics instruction with the Mathematics Teacher and Development (MTED) journal. (2021)
→ Currently reviewing an article about TIMMS and Achievement of US 4^{th} and 8^{th} grade students in selected groups with Journal for Multi-Cultural Education (JME) (April 2021-June 2021)
→ Elementary Statistics 13E by Triola, Pearson Higher Education (2020)

COMMUNITY SERVICE

-PSCTutoring for Children of NYSNA Nurses, Summer 2020

TEACHING

A. COURSES TAUGHT

Course Code	Course Title	Semester First Taught	Lehman or GC
ESC 595	Internship in Classroom Teaching	Spring 2022	Lehman
ESC 740	Teaching Mathematics in Grades 7-10	Spring 2022	Lehman
MAT 237/637	Applications of Discrete Math/ Topics in Discrete Mathematics	Spring 2022	Lehman
MAT 601	Secondary Math from an Advanced Standpoint	Spring 2022	Lehman
MAT 602	Intro to Numbers Theory and Modern Algebra	Fall 2021	Lehman
MAT 340/604	Foundations of Math/Applications of Real and Complex Numbers	Fall 2021	Lehman
MAT 123	Problem Solving Approach to Mathematics	Fall 2021	Lehman
ESC 595	Internship in Classroom Teaching	Fall 2021	Lehman
ESC 432/532	Teaching Mathematics in Middle & High school	Fall 2021	Lehman
MAT 172	Precalculus	Summer 2021	Lehman
MAT 123	Problem Solving Approach to Mathematics	Summer 2021	Lehman
ESC 532	Teaching Mathematics in Middle and High School	Summer 2021	Lehman
MAT 108	Trigonometry	Spring 2021	Lehman
ESC 789	Independent Study-Curriculum Development	Fall 2020	Lehman
ESC 790	Workshop Curriculum Materials Development	Summer 2020	Lehman
MAT 604	Applications of Real and Complex Numbers	Fall 2019	Lehman
MAT 340	Foundations of Mathematics	Fall 2019	Lehman
MAT 123	Problem Solving Approach to Mathematics	Fall 2019	Lehman
ESC 601	Secondary Mathematics-Advance Standpoint	Summer 2019	Lehman
ESC 748	Teaching Problem Solving in Mathematics in Middle and HS	Summer 2019	Lehman
MAT 602	Introduction to Number Theory & Modern Algebra 1	Spring 2019	Lehman
MAT 637	Topics in Discrete Mathematics	Spring 2019	Lehman

MAT 237	Applications of Discrete Mathematics	Spring 2019	Lehman
ESC 595	Internship in Classroom Teaching	Spring 2019	Lehman
ESC 470	Student Teaching in Middle & HS Grades (UG)	Spring 2019	Lehman
MAT 176	Calculus II	Fall 2018	Lehman
ESC 707	Project Seminar II	Fall 2018	Lehman
ESC 596	Student Teacging in Middle & HS Grades	Fall 2018	Lehman
MAT 132	Introduction to Statistics	Fall 2016	Lehman
MAT 604	College Algebra	Fall 2015	Lehman
ESC 740	Teaching Mathematics in Grades 7-10	Spring 2015	Lehman

B. <u>STUDENT EVALUATIONS</u> (since last personnel action, in reverse chronological order; excerpts of representative comments may be attached as a separate document)

Course	Semester	SETL 5.1 mean	SETL 5.1 median	SETL 5.2 mean	SETL 5.2 median	Number of responses
MAT 602-H81	Fa21	1	1	1	1	4
MAT 604-H81	Fa21	1	1	1.29	1	7
MAT 340-H81	Fa21	1.25	1	2	2	4
MAT 123-H01	Fa21	1.38	1	1.38	1	8
ESC 595-H12	Fa21	1	1	1	1	3
ESC 532-H81	Fa21	1	1	1	1	6
ESC 532-H01	Fa21	1.5	1	1.5	1	4
ESC 432-H01	Fa21	1.29	1	1.29	1	7
MAT 132-A85	Sp2021	1.06	1	1.19	1	16
ESC 595-FP02	Sp2021	2.0	2.0	1.67	1	3
ESC 595-FP03	Sp2021	1.0	1.0	1.0	1.0	4
ESC 740-A01	Sp2021	1.13	1.0	1.13	1.0	8
ESC 740-FP01	Sp2021	1.0	1.0	1.0	1.0	4
MAT 237-A01	Sp2021	1.69	1.0	1.81	1	16
MAT 601-A81	Sp2021	1.33	1.0	1.33	1.0	3
MAT 637-A01	Sp2021	1.4	1.0	1.7	1.5	10
MAT 604-A01	Fa2020	1.27	1	1.27	1	11
MAT 602-A01	Fa2020	1.9	1	2.5	2	10

ESC 789-AFP3	Fa2020	1	1	1	1	4
ESC 789-A08	Fa2020	1	1	1.5	1.5	2
ESC 789-A07	Fa2020	1.33	1	1.67	1	3
MAT 604-	Fa2019	2.13	2	2.75	2.5	8
MAT 602-81	Fa2019	1	1	1.67	1	3
MAT 340-01	Fa2019	1.71	1	1.86	1	7
MAT 123-01	Fa2019	1.14	1	1.21	1	14
MAT 176-02	Fa2018	1.67	2	2	2	3
MAT 132-CE 30	Fa2018	2.07	2	2.73	2	15
MAT 132-06FS	Fa2018	1.2	1	1.73	1	15
MAT 123-01C	Su2018	1.09	1	1.36	1	11
MAT 132-CE31	Sp2018	1.12	1	1.18	1	17
MAT 132-CE 30	Sp2018	1.33	1	1.44	1	9
MAT 132-CE31	Fa2017	2.0	2	1.89	1.5	18
MAT 132-CE30	Fa2017	1.0	1	1.08	1	12
MAT 104-01	Sp2017	1.62	1	1.92	1	13
MAT 132-ZG83	Fa2016	1.69	1.5	1.75	1.5	16
MAT 132-F402	Fa2016	2.08	2	2.33	2	12
ESC 740-XT82	Sp2016	1.1	1	1.2	1	10
ESC 740-NY11	Sp2016	1.5	1.5	1.5	1.5	2
MAT 104-09FY	Fa2015	1.13	1	1.2	1	15
MAT 104-08FY	Fa2015	1.46	1	1.62	1	13
ESC 740-XT81	Sp2015	1.43	1.0	1.57	1	7

CURRICULUM VITAE

JOSEPH L. FERA

Department of Mathematics
Lehman College, CUNY
Joseph.fera@lehman.cuny.edu

HIGHER EDUCATION

Institution	Dates Attended	Degree & Major	Date Conferred
Wesleyan University	2005-2011	PhD, Mathematics	May, 2011
Vassar College	2001-2005	BA, Mathematics	May, 2005

EXPERIENCE

Institution	Dates	Rank	Department
Lehman College	2020-Present	Associate Professor	Mathematics
Lehman College	2017-2020	Assistant Professor	Mathematics
Lehman College	2011-2017	Doctoral Lecturer	Mathematics
Lehman College	Summer 2011	Adjunct Instructor	Mathematics
Wesleyan University	2005-2011	Adjunct/TA	Mathematics
Vassar College	Spring 2005	Calculus Intern	Mathematics
Arlington Highschool	Fall 2004	Student Teacher	Mathematics
Clifden Ireland School	Spring 2004	Visiting Teacher	Mathematics

ACADEMIC AND PROFESSIONAL HONORS

- Teacher of the Year, Lehman College, Spring 2018
- Golden Key National Honor Society, Inducted Faculty, Spring 2015
- General Academic Honors, Vassar College, Spring 2005
- Honors in Mathematics, Vassar College, Spring 2005
- John Digiglio Excellence in Teaching Secondary Mathematics Award, Vassar College, Spring 2005

PUBLICATIONS/CREATIVE WORKS

- (w. K Burt, A Wahlstedt, M. Pinkas, and S Tamimi) *MyPlate represents an eating pattern aligned with white culture: results from a street intercept survey in New York City*, Journal of the Academy of Nutrition and Dietetics (submitted).

- (w. O Wenimo, CH Basch, and ET Jacques) *Teachers' Accounts of Burnout on an Online Community: A Content Analysis of Perceptions and Contributing Factors,* Journal of Community Health (submitted).

- (w. K Burt, S Debiasse, and Q Zubaida) *#InclusiveDietetics: A social media campaign improves beliefs associated with racial and ethnic diversity, equity, and inclusion in the dietetics profession*, Journal of Critical Dietetics (submitted).

- (w. L Samuel and L Basch) *Information seeking about genetically modified foods: readability of online information,* Journal of Public Health (accepted).

- (w. ET Jacques, CH Basch, and V Jones II) *#StopAsianHate A content analysis of TikTok videos focused on racial discrimination against Asians and Asian Americans during the COVID-19 pandemic*, Dialogues in Health (accepted).

- (w B Yalamanchili, L Donelle, LF Jurado, and CH Basch) *Investigating #covidnurse messages on TikTok: Descriptive Study*, JMIR-Nursing (2022), Jan 14; 5(1): e35274.PMID: 35029536.

- (C Jaime, L Samuel, and CH Basch) *Discussing health while seeking community: A descriptive study of celiacdisease on TikTok,* Nutrition and Health (2022) [Epub ahead of print]. PMID: 36148909.

- (w. Z Meleo-Erwin, CH Basch, and B Smith) *Discussion of Weight Loss Surgery in Instagram Posts: Successive Sampling Study*, JMIR-Perioperative Medicine (2021); 4(2):e29390. PMID: 34723828.

- (w. CH Basch, A Pellicane, and CE Basch) *Handwashing videos on TikTok during the COVID-19 pandemic: Potential for disease prevention and health promotion,* Infection, Disease, & Health (2021); S2468- 0451(21)00082-1. PMID: 34690108

- (w. K Burt, R Lopez, N Landaverde, E Avalos, A Paniagua) *Systemic and institutionalized racism, not achievement gap factors, limit the success of Black, Indigenous, and People of Color in dietetics education and credentialing* (2021), Journal of Critical Dietetics, Special Issue on Racism Against Blacks in Dietetics, 6(1):22-39.

- (w. K Burt and A Lewin-Zwerdling) *Differences in US Adults' Value of and Preferences for Sustainable Food by Race/ethnicity, Income, and Education*, Journal of Hunger & Environmental Nutrition (2021), 16:3, 321-335, DOI: 10.1080/19320248.2020.1823927

- (w. CH Basch, A Pellicane, and CE Basch) *Videos With the Hashtag #vaping on TikTok and Implications for Informed Decision Making by Adolescents:*

Descriptive Study, JMIR- Pediatrics and Parenting (2021); 4(4):e30681. PMID: 34694231.

- (w. CH Basch and B Yalamanchili*) #Climate change on TikTok: A Content Analysis of Videos. Journal of Community Health* (2021); [Epub ahead of print]. PMID: 34545460

- (w. CH Basch, J Mohlman, H Tang, A Pellicane, and CE Basch) *Community Mitigation of COVID-19 and Portrayal of Testing on TikTok: Descriptive Study*, JMIR-Public Health and Surveillance (2021); PMID: 34081591

- (w. CH Basch, Z Meleo-Erwin, J Mohlman, and N Quinones) *#winemom and #momjuice posts on Instagram during the COVID-19 pandemic: A cross-sectional, descriptive study*, JMIR- Pediatrics and Parenting (2021); 4(2): e28991 PMID:33848257

- (w. CH Basch and N Quinones) *A Content Analysis of Direct-to-Consumer DNA testing on TikTok*, Journal of Community Genetics (2021) [Epub ahead of print]. PMID: 33860464

- (w. Z Meleo-Erwin, CH Basch, and M Arrowwood) *How did individuals on Instagram discuss COVID-19 in the month following official pandemic status: An examination of user content*, Journal of Prevention and Intervention in the Community (2021), [Epub ahead of print]. PMID: 33966615

- (w. CH Basch) Candy, snack food, and soda in the checkout lines of stores selling products for children in New York City. Journal of Community Health (2021), [Epub ahead of print]. PMID: 33710452

- (w. CH Basch, Z Meleo-Erwin, C Jaime, and CE Basch) *A global pandemic in the time of viral memes: COVID-19 vaccine misinformation and disinformation on TikTok*, Human Vaccines & Immunotherapeutics (2021), [Epub ahead of print]. PMID: 33764283

- (w. P. Garcia, J. Mohlman, and CH Basch) *Assessing the Readability of COVID-19 Testing Messages on The Internet,* Journal of Community Health (2021), [Epub ahead of print]. PMID: 33638806

- (w. CH Basch, I Pierce, and CE Basch) *Promoting Mask Use on TikTok: Descriptive, Cross-sectional Study*, JMIR-Public Health and Surveillance (2021), PMID 33523823
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- (w. CH Basch, Z Meleo-Erwin, C Jaime, and CE Basch) *A global pandemic in the time of viral memes: COVID-19 vaccine misinformation and disinformation on TikTok*, Human Vaccines & Immunotherapeutics (2021), PMID 33764283. DOI:10.1016/j.dhjo.2020.101013 [Epub ahead of print].

- (w. Z Meleo-Erwin. CH Basch, and P Garcia) *Readability of online dengue materials: The need for accessible information as part of infectious disease prevention and control efforts,* Infection, Disease, & Health (2020), 25(4): 277-282. DOI:10.1016/j.idh.2020.04.005.
- (w. Z Meleo-Erwin, B Kollia, A Jahren, and CH Basch) *Online Support Information for Students with Disabilities in Colleges and Universities during the COVID-19 Pandemic*, Disability and Health (2020), [Epub ahead of print]. PMID: 33082111.
- (w. EJ Seidel, J Mohlman, CH Basch, A Cosgrove, and D Ethan) *Communicating mental health support to college students during COVID-19: An exploration of website messaging*, Journal of Community Health (2020), [Epub ahead of print]. PMID: 32767191.
- (w. D Ethan, Z Meleo-Erwin, P Garcia, and CH Basch) *Readability of Online Information on Celiac Disease: A Brief Report.* Journal of Consumer Health on the Internet (2020), 24:2, 126-134.
- (w. CH Basch, C Jaime, and N Quinones) Coverage of the 2019 Eastern Equine Encephalitis Virus Outbreak on News Media. *Health Promotion Perspectives.* (2020), 10(3), 1-3. PMID:32802766
- (w. Z Meleo-Erwin, CH Basch, and B Smith) *#celiacdisease: The use of Instagram in Contending with Chronic Illness.* Journal of Consumer Health on the Internet (2020), 24(1), 35-42.
- (w. CH Basch and Garcia P) *Information regarding Zika Virus on the Internet: A Cross-Sectional Study of Readability.* American Journal of Infection Control (2019), [Epub ahead of print]. PMID: 31862166
- (w. CH Basch and P Garcia) *Readability of influenza information online: implications for consumers*, American Journal of Infection Control (2019), [Epub ahead of print]. PMID: 31253552.
- (w. A Lazowski) *Exceptional points for geometrically finite fuchsian groups of the first kind*, Advances in Geometry (2019). [Epub ahead of print]. DOI: https://doi.org/10.1515/advgeom-2019-0013.
- (w. K Burt, N Lindel, J Wang, and N Burgermaster) *A nationwide snapshot of the predictors of and barriers to school garden success*, Journal of Health Education and Behavior (2019). [Epub ahead of print] DOI: https://doi.org/10.1016/j.jneb.2019.06.020.
- (w. CH Basch and P Garcia) *Readability of information on the internet related to clostridium difficile*, Journal of Consumer Health on the Internet 23 (2019), no. 3, 1-6.
- (w. Z Meleo-Erwin, CH Basch, D Ethan, and P Garcia) *Readability of online patient-based information on bariatric surgery*, Health Promotion Perspectives 9 (2019), no. 2, 156-160.

- (w. CH Basch, D Ethan, S Maclean, P Garcia, and CE Basch) *Readability of prostate cancer information on-line: a cross-sectional stud*y, American Journal of Men's Health 12 (2018), no. 5, 1665-1669.
- (w. CH Basch, D Ethan, P Garcia, D Perin, and C E Basch) *Readability of online material related to skin cancer*, Public Health 163 (2018), 137-140.
- (w. D Bravo) *Rotating real-valued functions in the plane*, Internat. J. Math. Ed. Sci. Tech. 46 (2015), no. 8, 1259-1264.
- *Exceptional points for cocompact fuchsian groups*, Ann. Acad. Sci. Fenn. Vol 39 (2014), 463-472.
- (w. D Bravo) *Mathematical minute: rotating function graph*s, College Mathematics Journal. 44 (2013) no. 2, 124-125.
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PRESENTATIONS

- *Farewell to President Cruz Ceremony*, Master of Ceremonies, Summer 2019.
- *Lehman College's Convocation*, Master of Ceremonies, Fall 2018.
- *Exceptional Points for Cocompact Fuchsian Groups*, CUNY Graduate Center Hyperbolic Geometry Seminar, Invited Speaker, Spring 2018.
- *Cracking the Remedial Math Nut*, Innovative Practices in Developmental Mathematics, Co-Speaker with Pamela Hinden, Spring 2018.
- *Lehman College's 50th Commencement*, Master of Ceremonies, Spring 2018.
- *Graduation in Four Years at Lehman College CUNY*, Dean's Conversation Series, Lehman College CUNY, Spring 2015.
- *Rotating a Function's Graph: From Conversation to Publication*, Sacred Heart University, Spring 2015.
- *Addressing the Needs of a Diverse Learning Community*, Second Annual Conference, Lehman College CUNY, Spring 2015.
- *Exponential Baseball*, Lehman Digital Connect Project, Lehman College CUNY, Spring 2014.
- *Rotating A Function's Graph: From Friendly Conversation To New Theorem*, CSM Scholarship Program, Lehman College CUNY, Fall 2012.

- *Getting College Ready*, P.S./I.S. 163, Brooklyn NY, Summer 2012.

- *The Scholarship of Teaching and Learning*, Panel Organizer, MAA Special NExT Session, Joint Mathematics Meetings, Spring 2012.

PH.D. DISSERTATION:

Dissertation Title: *On Exceptional Points for Cocompact Fuchsian Groups*, Spring 2005
Research Adviser: *Petra Bonfert-Taylor, PhD*

Content Areas: *Hyperbolic Geometry, Complex Variables, and Geometric Function Theory*

WORK IN PROGRESS

- *Nearest point retraction maps on continuous images of intervals*, in progress.
    - Brief Description: The nearest point retraction map is a function described geometrically by considering the point of first contact between a given domain, a given range, and an expanding circle. Traditionally, the nearest point retraction map has been used on domains and ranges embedded in 3-space. This work considers the same type of map applied to a 2-dimensional setting. More concretely, we investigate the nearest point retraction map between an interval I and the image of I under a continuous map.

- *Higher order exceptional points for geometrically finite fuchsian groups of the first kind*, in progress.
    - Brief Description: The Dirichlet region is a hyperbolic polygon that completely describes the action of a fuchsian group on hyperbolic space. This polygon's number of sides is bounded (from above) and, in almost every case, this maximum number of sides is attained. Points admitting Dirichlet regions with fewer than this max number of sides are called exceptional; regions having significantly fewer sides are called exceptional of higher order. This work addresses these higher order exceptional cases in the most general setting possible.

- (w. A Lazowski) *Convergence of uniformly perfect domains and their associated domes*, in progress.
    - Brief Description: The dome of a 2-dimensional planar domain is a 3-dimensional geometric object constructed by embedding maximal hemispheres within the domain's boundary. These domes not only have interesting geometry, but they have also been applied to several applied problems in hyperbolic geometry and complex variables. This article considers a special class of planar domains, called uniformly perfect, and studies what conclusions can be drawn about the domes associated to a converging sequence of such domains.

- (w. D Bravo) *Rotating function graphs in space*, in progress.

- Brief Description: Every function f has an associated graph; it is the collection of coordinates (x,f(x)) where x is taken from the function's domain. It is not true, however, that every collection of coordinates describes the graph of a function. This work considers when rotating a function's graph in 3-dimensional space results in the graph of another function. The authors have already provided a full solution to this same question when asked in the 2-dimensional plane. Here, we look to extend these results to more complicated graphs.

GRANTS

- *RFP in Support of Developmental Education*, FY 2018-2019.
- *Immersion Intervention for Senior College RFP*, FY 2017-2018
- *Category I Novice IBL Grant*, Academy of Inquiry Based Learning, Spring 2013

SERVICE

- Chair, Department of Mathematics, Fall 2020-Present.
- Mathematics Department P&B, Member, Fall 2017 - Present.
- Lehman College Senate, Chair, Spring 2019 - Present.
- Lehman College Governance Committee, Chair, Spring 2019 - Present.
- CUNY Faculty Governance Leaders, Member, Spring 2019 - Present.
- Presidential Taskforce on Campus Climate, Inclusion, and Diversity, CoChair, Fall 2020.
- Deputy Chairman, Department of Mathematics, Fall 2017 – Spring 2020
- Lehman Academic Momentum Team, Member, Fall 2018 – Spring 2020.
- Middle States Steering Committee, Member, Fall 2018 - Spring 2019.
- Middle States Review Committee, Standard IV, Member, Fall 2016-Spring 2018.
- Co-Deputy Chairman of Mathematics, Department of Mathematics and Computer Science, Fall 2014-Spring 2017.
- Lehman College Governance Committee, Member, Fall 2016-Present.
- Lehman College Budget & Long-Range Planning Committee, Member, Fall 2015-Spring 2017.
- Calculus Camps, CUNY Cross Campus Initiatives, Lehman College Campus Director, Spring 2014 - Fall 2015.
- Lehman College Senate, Member, Fall 2013 - Present.
- Mathematics Graduate Adviser, Fall 2013 - Present.

- Noyce Scholarship Steering/Research Committee, Member, Fall 2013 - Spring 2017.
- MAT 126: Quantitative Reasoning Coordinator, Lehman College CUNY, Fall 2013 - Present.
- Department Adviser Search Committee, Member, Fall 2013 - Spring 2014.
- Math Ed. Lecturer Search Committee, Member, Fall 2013 - Spring 2014.
- MAT 172: Precalculus Coordinator, Lehman College CUNY, Spring 2012 - Present.
- Educational Policy Committee Member, Lehman College CUNY, Spring 2012 - Present.
- Department Liaison to MAA Metro Section, Lehman College CUNY, Spring 2012 - Present.
- Divisional Curriculum Committee Member, Lehman College CUNY, Fall 2011 - Spring 2012.

TEACHING

A. COURSES TAUGHT

Course Code	Course Title	Semester First Taught	Lehman or GC
MAT 104	College Algebra	FA 2016	Lehman
MAT 108	Trigonometry*	FA 2018	
MAT 123	A Problem-Solving Approach to Mathematics	SU 2011	Lehman
MAT 126	Quantitative Reasoning*	FA 2012	Lehman
MAT 132	Introduction to Statistics	SP 2017	
MAT 155	Calculus I Laboratory	FA 2014	Lehman
MAT 171	Elements of Precalculus	FA 2018	Lehman
MAT 172	Precalculus	FA 2011	Lehman
MAT 175	Calculus I	SP 2013	Lehman
MAT 176	Calculus II	FA 2015	Lehman
MAT 226	Vector Calculus	SP 2015	Lehman
MAT 237/637	Applications of Discrete Mathematics	SP 2013	Lehman
MAT 320 /640	Analysis I	FA 2016	Lehman
MAT 321/641	Analysis II	SU 2017	Lehman
MAT 345/630	Axiomatic Geometry	SP 2012	Lehman
MAT 348	Mathematical Methods for Management	SP 2014	Lehman
MAT 441/775	Set Theory	SU 2016	Lehman
MAT 451	Geometry Seminar	SU 2017	Lehman
MAT 601	Secondary School Mathematics from an Advanced Standpoint	SP 2012	Lehman
MAT 602	Introduction to Number Theory and Modern Algebra I	FA 2012	Lehman

MAT 604	Applications to the Real and Complex Number Systems	FA 2011	Lehman
MAT 631	Views of Geometry	FA 2013	Lehman
MAT 655	Exploring Mathematics Using Technology	FA 2012	Lehman
CMP 232	Elementary Discrete Structures & Apps	FA 2014	Lehman

*Courses taught under different numbers at the time

B. STUDENT EVALUATIONS

Course	Semester	SETL 5.1 mean	SETL 5.1 median	SETL 5.2 mean	SETL 5.2 median	Number of responses
MAT 171	FA 2018	1.07	1	1.14	1	14
MAT 173	FA 2018	1.07	1	1.21	1	14
MAT 226	SP 2018	1	1	1.31	1	16
MAT 176	FA 2017	1.17	1	1.25	1	12
MAT 655	FA 2017	1	1	1	1	4
MAT 132	SP 2017	1	1	1.1	1	10
MAT 176	SP 2017	1	1	1	1	1
MAT 226	SP 2017	1	1	1	1	14
MAT 348	SP 2017	1	1	1.23	1	13
MAT 104	FA 2016	1	1	1	1	7
MAT 176	FA 2016	1	1	1	1	19
MAT 320	FA 2016	1	1	1.38	1	13
MAT 655a	FA 2016	1	1	1	1	5
MAT 655b	FA 2016	1	1	1	1	4
MAT 172	SP 2016	1	1	1.23	1	22
MAT 226	SP 2016	1	1	1.08	1	13
MAT 345	SP 2016	1	1	1	1	10
MAT 630	SP 2016	1	1	1	1	8
CMP 232	FA 2015	1	1	1.23	1	22
MAT 172	FA 2015	1.33	1	1.44	1	9
MAT 176	FA 2015	1.07	1	1.5	1	14
MAT 237	FA 2015	1	1	1.2	1	5
MAT 637	FA 2015	1	1	2	2	2
CMP 232	SP 2015	1	1	1.2	1	5
MAT 226	SP 2015	1	1	1.07	1	14
MAT 237	SP 2015	1	1	1	1	6
MAT 637	SP 2015	1	1	1	1	3
CMP 232	FA 2014	1.2	1	1.2	1	10
MAT 155a	FA 2014	1.08	1	1.17	1	12
MAT 155b	FA 2014	1	1	1	1	10
MAT 237	FA 2014	1	1	1	1	3
MAT 602	FA 2014	1	1	1	1	6
MAT 637	FA 2014	1	1	1	1	3
MAT 655	FA 2014	1	1	1	1	2
CMP 232	SP 2014	1.1	1	1.5	1	10
MAT 237	SP 2014	1	1	1	1	2
MAT 348	SP 2014	1.06	1	1.19	1	16
MAT 637	SP 2014	1	1	1	1	1

MAT 602	FA 2013	1	1	1	1	3
MAT 631	FA 2013	1	1	1	1	1
MAT 655	FA 2013	1	1	1.43	1	7
MAT 175	SP 2013	1	1	1.18	1	11
MAT 237	SP 2013	1	1	1.25	1	4
MAT 345	SP 2013	1.5	1	1.25	1	4
MAT 630	SP 2013	1	1	1	1	1
MAT 637	SP 2013	1	1	1	1	1
MAT 135	FA 2012	1	1	1	1	7
MAT 602	FA 2012	1.33	1	1.33	1	3
MAT 655	FA 2012	1.13	1	1.13	1	8
MAT 172a	SP 2012	1.8	1	1.8	1	15
MAT 172b	SP 2012	1	1	1.17	1	18
MAT 345	SP 2012	1	1	1	1	10
MAT 601	SP 2012	1.83	1	1.67	1	6
MAT 630	SP 2012	1	1	1	1	1
MAT 172a	FA 2011	1.33	1	1.77	1	12
MAT 172b	FA 2011	1.45	1	1.73	1	22
MAT 604	FA 2011	1.5	1.5	2	2	2

LEHMAN COLLEGE

DEPARTMENT OF MATHEMATICS

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CURRICULUM VITAE

TANJA HAXHOVIQ
85 Street,
Brooklyn, NY 11218
Tanja.Haxhoviq@lehman.cuny.edu

EDUCATION:

Ph.D. Candidate in Mathematics (A.B.D status), The Graduate School and University Center at CUNY
2015- M.Phil. Mathematics, The Graduate School and University Center at CUNY
2010- M.A Mathematics, The Graduate School and University Center at CUNY
2002 - 2005 B.S. Mathematics, Brooklyn College at CUNY, May 2005

SUMMARY OF QUALIFICATIONS

- Teaching college mathematics courses from beginner to advanced and graduate levels
- Effective use of online resources to supplement instruction such as Blackboard
- Experience teaching large classes of over 50 students using online resources
- Analysis of academic standards and evaluations for mathematics courses
- In-depth knowledge of the college academic majors and requirements
- Knowledge of student services programs and of automated student information systems
- Academic Advising
- College and career assessments and counseling
- Student guidance and mentorship
- Individual student advising on complex student-related matters
- Navigating and enforcing college rules and regulations
- Wide knowledge of academic program development, and corresponding program management and administrative functions

TEACHING EXPERIENCE

2014 – Present
Adjunct Lecturer, Lehman College (CUNY)

Courses
Calculus I, Calculus II, Vector Calculus, Discrete Mathematics, Number Theory, Axiomatic Geometry, Cryptography, History of Mathematics, Analysis 1, and Abstract Algebra

2012-2014
Substitute Lecturer, Lehman College (CUNY)

Courses
College Algebra, Precalculus, Calculus I, Elements of Calculus, Calculus II, Vector Calculus, Discrete Mathematics, Statistics, and Number Theory

2005- 2012
Adjunct Lecturer, Brooklyn College (CUNY)
Adjunct Lecturer, Kingsborough Community College (CUNY)
Teacher, Magen David High School

Courses
College Algebra, Precalculus, Precalculus using the SCALE-UP method, Calculus I, Statistics, Thinking Mathematically

PROFESSIONAL/ACADEMIC ADVISING EXPERIENCE

2014-Present
Senior Academic Adviser for Mathematics and Computer Science Departments

Duties

- Advised diverse populations of students within scope of responsibility, such as new or transfer students, undeclared majors, minority groups, etc., assisting in exploration of academic programs, and focusing on academic direction, procedures, policies, and available resources as well as offering academic and personal support through the course selection process.
- Analyzed and evaluated the student's educational progress by performing academic progress audits.
- Developed and maintained the student files, databases and records, prepared activity reports and analysis.
- Provided advice on specific programs such as mathematics education, computer graphics and imaging, mathematics and economics and to specific student groups such as SEEK, ACE, PTS3, and SYI.
- Advised an average of over 4000 students per academic year including individuals and small groups to continuously develop action plans for academic success.
- Advised over 700 students per academic year who major in Mathematics, Computer Science, and Computer Information Systems
- Provided outreach, referrals, and intervention for the student population.
- Developed activities and workshops to support new students, students on

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academic warning, and honors students.
- Collaborated with Academic Affairs and College Administrative Offices regarding curriculum updates, scheduling, student concerns and needs to maintain industry standards and policy.
- Participated and supported all key departmental activities including tracking statistics, proper file documentation, departmental meetings, strategic planning and program assessment.
- Served on appropriate department, college and/or campus advisory committees.
- Served as the faculty mentor for the Computer Science and Mathematics Club overseeing a team of 4 student leaders

TALKS AND PRESENTATIONS

Recent Talks at Student Number Theory Seminar at Graduate Center (most recent listed first from 2019 to 2012)

- Sumsets Containing Infinite Arithmetic Progressions
- Freiman's Inequality and Erhart Polynomial
- Metric Inqualities For Lattice Polygons-upper and Lower Bounds for The Perimeter, Diameter and Width of a Lattice Polygon with A Fixed Number of Interior Lattice Points
- Oscillations of Bases for The Natural Numbers
- External result on Convex Polytopes
- Problems related to Calkin-Wilf Tree
- Lovasz Local Lemma
- Diameter and Width of Convex Polytopes
- Minkowski's Theorems in the Geometry of Numbers
- Bohr Sets
- Freiman's Inequality for Sums of Lattice Points
- A partition problem of Canfield and Wilf
- Problems Related to Stern Sequence
- A Geometric Approach to Continued Fractions

RESEARCH INTERESTS

Current research interest is in the geometric structure of sumsets. Generally given a finite set of lattice points when comparing its sumsets and lattice points in its dilated convex hull, there are results that show that sumsets occupy all the central lattice points in convex hull, thus giving a kind of approximation to lattice points in polytopes. Currently interested in the density or distribution of sumsests in the *boundary region* of such dilated polytopes.

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AWARDS AND FELLOWSHIPS

Graduate Teaching Fellow, The Graduate School and University Center (CUNY), Fall 2006- Spring 2010

DEPARTMENTAL SERVICE

Search Committee member for Assistant Professor of Mathematics search (Fall 18- Spring 19)
Search Committee member for Mathematics Open Rank search (Fall 17 – Spring 18)
Search Committee member for Math Lecturer and Math Ed. Lecturer search (Fall 17 – Spring 18)
Assignment and Distribution of Departmental Final Exams for College Algebra, Statistics and Precalculus
Assessment of historical passing rates for College Algebra, Precalculus, and Calculus

LEHMAN SERVICE

Lehman STEM Advising Committee (Spring 18- Present)
Lehman Committee on Admissions, Evaluation and Academic Standards -CAEAS (Spring 2020)

Math-Chair of Pre-Health Evaluation Committee (Fall 18- Present)

CUNY SERVICE

Lehman Representative at CUNY Math Placement Working Group for CUNY's New Proficiency Index (Fall 17- Winter 19)
Lehman Representative for Math at CUNY STEM Committee for evaluating STEM education at CUNY (Fall 19)
Lehman Representative CUNY Statistics Articulation Committee (Fall 17)
Lehman Co-chair at Math Discipline Council (Fall 16 – Present)
Math and Computer Science Lehman Representative at Career Wise New York for Modern Youth Apprenticeship Council Powered by Here to Here (Fall 19- Present)

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REFERENCES

Teaching/Advising References

Prof. Robert Schneiderman – Chair of Mathematics Department, Professor, Lehman College (CUNY), Robert.Schneiderman@lehman.cuny.edu

Prof. Brian Murphy – Chair of Computer Science Department, Assoc. Professor, Lehman College (CUNY), Brian.Murphy@lehman.cuny.edu

Prof. Joseph Fera – Asst. Professor, Department of Mathematics, Lehman College (CUNY), Joseph.Fera@lehman.cuny.edu

Prof. Jun Hu- Chair (2010- 2012), Professor, Department of Mathematics, Brooklyn College (CUNY), junhu@brooklyn.cuny.edu

Academic References

Prof. Melvyn Nathanson - Professor, Lehman College (CUNY) and The Graduate School and University Center (CUNY) melvyn.nathanson@Lehman.cuny.edu

Prof. Kevin O'Bryant - Professor, Staten Island College (CUNY) and The Graduate School and University Center (CUNY), obryant@gmail.com

LANGUAGES

Fluent in English and Albanian.
Conversational in Spanish, Russian and Serbo-Croatian languages.

SETL RESULTS

A. STUDENT EVALUATIONS (since last personnel action, in reverse chronological order; excerpts of representative comments may be attached as a separate document)

Student Evaluation of Teaching and Learning (SETL) section 5.1 refers to the overall rating of the instructor and section 5.2 refers to the overall rating of the course. The rating is based on a 5-point scale where 5 is poor and 1 is excellent.

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Course	Semester	SETL 5.1 mean	SETL 5.1 median	SETL 5.2 mean	SETL 5.2 median	Number of responses
MAT 417	Fall 2019	1.1	1	1.1	1	10
CMP 417	Fall 2019	1	1	1	1	3
MAT 314	Summer 2019	1.13	1	1.88	1	8
MAT 320	Spring 2019	1.5	1	1.69	1	16
MAT 176	Summer 2018	1.25	1	1.31	1	16
MAT 345	Spring 2018	1.4	1	1.8	1.5	10
MAT 176	Fall 2017	2	2	2	2	10
MAT 615	Summer 2017	2	2	2	2	2
MAT 314	Summer 2017	1.83	1.5	2	2	6
MAT 661	Spring 2017	1	1	1	1	2
MAT 613	Fall 2016	1	1	1	1	2
MAT 316	Fall 2016	1	1	1.46	1	13
MAT 661	Summer 2016	1.8	1	1.6	1	5
MAT 343	Summer 2016	1	1	1.5	1.5	2
CMP 417	Spring 2016	1.43	1	1.8	1	7
CMP 788	Spring 2016	1	1	1	1	4
MAT 719	Spring 2016	2	2	2	2	2
CMP 232	Fall 2015	1.8	1	2.1	1.5	10
MAT 237	Fall 2015	1.33	1	2	2	6
MAT 637	Fall 2015	2	2	2	2	1

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MAT 343	Spring 2015	1.17	1	1.33	1	12
MAT 661	Spring 2015	1.5	1.5	2	2	4
MAT 175	Spring 2014	1.57	1	1.71	2	7
MAT 176	Spring 2014	2.3	1.5	2.4	2	10
MAT 176	Spring 2014	1.5	1	1.63	1.5	8
MAT 226	Spring 2014	1.78	1	1.89	2	9

Kevin Anthony Johnson

Contact Information	764 Dawson St Bronx, NY 10455-1857	Tel: (917) 517-5281 E-mail: kjohnson@lehman.cuny.edu

Strengths

Experienced educator with broad science, technology, and medical background, specializing in both remedial and advanced mathematics courses; Offers extensive tutoring to help struggling students improve critical-thinking and problem-solving skills.

Employment

Lecturer (Mathematics), Lehman College, NY (Aug 2020 - Present)
Substitute Lecturer (Mathematics), Lehman College, NY (Aug 2019 - Aug 2020)
Instructor, PTS3 Program (Lehman College) (January 2020 - Present)
Adjunct Lecturer (Mathematics), Lehman College, NY (Aug 2015 - Present)
Adjunct Lecturer (Mathematics), Hostos Community College, NY (Aug 2014 - Present)

Teaching Experience

Lehman College: Analysis I (MAT 320); History of Mathematics (MAT 243); Abstract Algebra (MAT 314); Linear Algebra (MAT 313); Calculus II (MAT 176); Calculus I (MAT 175); Precalculus (MAT 172); Elements of Precalculus (MAT 171); Introduction to Statistics (MAT 132); Trigonometry (MAT 108).
Hostos Community College: College Algebra with Trigonometric Functions (MAT 150).

Education

M.A. in Mathematics (May, 2016), Lehman College, CUNY
M.Sc. in Theoretical Physics (June, 1994), Kharkiv National University, Ukraine
Ph.D. in Mathematics (discontinued), CUNY Graduate Center

Service

Statistics Coordinator, Mathematics Department, Lehman College
Member, Executive Committee of the General Faculty, Lehman College (2022–2024)
Member, Committee on Academic Freedom, Lehman College Senate (2021–2023)
Mentor, National Alliance for Doctoral Studies in the Mathematical Sciences
Developer/Instructor, Bridge to Calculus Workshop, Lehman College (Winter, 2020)

Professional Development

National Alliance for Doctoral Studies in the Mathematical Sciences (Math Alliance)
New York Number Theory Seminar (CUNY Graduate Center)

Professional Affiliations

American Mathematical Society (AMS); Society of Actuaries (SOA); Casualty Actuarial Society (CAS); American Finance Association (AFA).

Research Interests

Algebra and number theory, combinatorics, actuarial science.

Conferences

Combinatorial and Additive Number Theory (CANT) 2015–2022

Skills

Languages: English, Russian
Programming: `C/C++`, Java, LaTeX

Other Research & Publications

1. *The Potential for Compton Scattered X-rays in Food Inspection: The Effect of Multiple Scatter and Sample Inhomogeneity*, with NJB McFarlane, CR Bull, RD Tillett, RD Speller, and GJ Royle, J Agr Eng Res, **75** (2000), no. 3, 265-274.
2. *On the Problem of the Ground State of a Superconducting Twinning Plane*, M.Sc. Thesis, Kharkiv National University, 1994.

Other Degrees

B.S. in Information Technology (October 2015), Western Governors University

References

Joseph Fera, Lehman College, joseph.fera@lehman.cuny.edu
Robert Schneiderman, Lehman College, robert.schneiderman@lehman.cuny.edu
Zoltán Szabó, Lehman College, zoltan.szabo@lehman.cuny.edu

Curriculum Vitae

Leon Karp

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H. H. Lehman College/ CUNY
Bedford Park Boulevard West
Bronx, NY 10468

Ph.D. Program in Mathematics
The Graduate School and University Center /CUNY
365 Fifth Avenue
New York, NY 10016

email: leon.karp@lehman.cuny.edu, lkarp@gc.cuny.edu
Date of Birth: February 16, 1950

Education:

B.A., Yeshiva University, 1971
M.S., Courant Institute, New York University, 1973
Ph.D., Courant Institute, New York University, 1976
Thesis advisor: L. Nirenberg

Academic Career and Awards:

Courant Institute of Mathematical Sciences Fellow,
Research Assistant, 1971-75
Washington Square - University College, New York University,
Lecturer in Mathematics, 1975-77
Princeton University, Instructor, 1977-79;
Research Associate, 1979-80
National Science Foundation Postdoctoral Fellow, 1979-80
Institute for Advanced Study, Member, 1979-80
University of Michigan, Assistant Professor, 1980-84
University of Maryland, Visiting Assistant Professor,
Special Year in Differential Geometry, 1981-1982
Universitat Bonn, Sonderforschungsbereich fur Mathematik,
Visiting Member, June 1983
City University of New York: H.H. Lehman College and CUNY Graduate Center,
Associate Professor, 1984-1988
Professor, 1989-
Research Institute for Mathematical Sciences, Bar Ilan University,
Visiting Member, January 1989
Institute of Mathematics, Hebrew University,
Lady Davis Visiting Professor, 1990-1991

NSF Grants: 1977-84, 1985-88,1992-95

PSC- CUNY Research Awards: PSC-CUNY cycles 22, 24 through 30, 32, 33
(and no application were filed for other cycles)

Selected Invited Talks and Addresses:

Conference on Diffusion Processes, Institute of Mathematics,
Hebrew University, January 1989
Research Institute in Mathematics, Bar-Ilan University, January 1989,
Series of Lectures on Diffusion and Potential Theory on Manifolds
Conference on Diffusion Processes and Related Problems in Analysis,
Northwestern University, October 1989
Special Session on Spectral Theory, AMS winter meeting, January 1990
AMS Summer Institute in Differential Geometry, University of California,
Los Angeles, California, July 1990
Conference on Partial Differential Equations, Institute of Adv. Studies in Mathematics
Technion, Haifa, Israel, December 1990
Israel Mathematical Union, 1991 Meeting, Invited Address, May 1991
Micro-Program in Riemannian Geometry, Fields Institute, University of Waterloo,
August 1993
Workshop on Differential Geometry and Stochastic Analysis,
Mathematics Research Center, University of Warwick, UK , July 1995

Publications

Parallel vector fields and the topology of manifolds, Bull. Amer. Math. Soc. 83
(1979), 1051--1053
On Stokes' theorem for noncompact manifolds, Proc. Amer. Math. Soc. 82 (1981),
487--490
Asymptotic behavior of solutions of elliptic equations I, J. d'Analyse Math., 39 (1981),
75--102
Asymptotic behavior of solutions of elliptic equations II, J. d'Analyse Math., 39 (1981),
103--115
Subharmonic functions on real and complex manifolds, Math. Z., 179 (1982),
535--554
Subharmonic functions, harmonic mappings, and isometric immersions, in: Seminar in
Differential Geometry, S.T. Yau ed., Annals of Math. Studies 42, Princeton ,
1982, 133--142
The growth of harmonic functions and mappings, in: Differential Geometry, R. Brooks,
A. Gray, B. Reinhardt, eds. Birkhauser, Boston, 1983
Noncompact Riemannian manifolds with purely continuous spectrum, Mich. Math J.
31 (1984), 339--347
Differential inequalities on complete Riemannian manifolds, Math Ann. 272 (1985), 449--459
The mean exit time from a tube in a Riemannian manifold (with A. Gray and M. Pinsky),
in: Probability Theory and Harmonic Analysis, J. Cao and W. Wojczynsky, eds.,
Marcel Dekker, NY (1985), 113--137

Elliptic operators and a theorem of Poincare, Proc. Amer. Math. Soc. 95 (1985), 649--652
The mean exit time from an extrinsic ball (with M. Pinsky), in: From Local Times to Global Geometry, Control, and Physics, K. Elworthy, ed., Longman/Wiley, NY, 1986, 179--186
The first eigenvalue of a small geodesic ball in a Riemannian manifold (with M. Pinsky), Bull. Sc. Math. 111 (1987), 229--239
Spectral and function theory for combinatorial Laplacians (with J.Dodziuk), Contemporary Math. 73 (1988), 25--40
First -order asymptotics of the principal eigenvalue of tubular neighborhoods (with M. Pinsky), Contemporary Math. 73 (1988), 105--119
The volume of a small extrinsic ball in a submanifold (with M. Pinsky), Bull. London Math. Soc. 21 (1989),87--92
Movement of hot spots in Riemannian manifolds (with I.Chavel), J.d'AnalyseMathematique 55 (1990), 271--286
Large-time behavior of the heat kernel: the parabolic λ_0 - potential alternative (with I. Chavel), Comment. Math. Helv. 66 (1991), 541--556
Large-time decay of the heat kernel of λ_0-transient Riemannian manifolds (with I. Chavel and E. Feldman), preprint
Large-time behavior of solutions of the heat equation (with I. Chavel), Proc. Symp. Pure Math. 54 (1993), 123--128
On the distribution of hypersurfaces equidistant from totally geodesic submanifolds in hyperbolic space (with N. Peyerimhoff), Analysis 18 (1998),217--225
Horospherical means and the equidistribution of curves of constant geodesic curvature, (with N. Peyerimhoff), Math. Z. 231(1999), 655—677
Spectral gaps of Schrodinger operators on hyperbolic space (with N.Peyerimhoff), Math. Nachr. 217 (2000), 105--124
Extremal properties of the principal Dirichlet eigenvalue for regular polygons in the hyperbolic plane (with N. Peyerimhoff), Arch. Math. 79(2002) 223—231
Geometric heat comparison criteria for Riemannian manifolds (with N. Peyerimhoff) Annals of Global Analysis and Geometry 31 (2007) 115 – 145

PhD Thesis Supervised at CUNY Graduate Center

Yimao Chen, Uniqueness of solutions of several nonlinear parabolic equations, 2012

Service to CUNY

Doctoral Faculty Policy Committee - member , 9/1/ 02 – 8/ 31/05
Chairman of Mathematics Panel, Research Foundation of CUNY, 2003-2007
Executive Committee, PhD. Program in Mathematics - member, numerous times
Personnel and Budget Committee, Dept. of Mathematics, Lehman College, - member, numerous times
Educational Policy Committee, Dept. of Mathematics, Lehman College, - member, numerous times

NIKOLA LAKIC

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nikola.lakic@lehman.cuny.edu

Department of Mathematics
Lehman College and Graduate Center
CUNY

EDUCATION

PhD Graduate Center CUNY — June 1995
Dissertation: "On the geometry of the Teichmuller space"

BS University of Belgrade — February 1990

HONORS AND AWARDS

NSF grants **1997-1999, 1999-2002, etc.**

EXPERIENCE

Brooklyn College, CUNY, 1993 to 1995
Adjunct Lecturer

Cornell University 1995 to 1998
H.C.Wang Fellow

Lehman College, CUNY 1998 to present

Yale University, 2008
Visiting professor

Wesleyan University, 2009
Visiting professor

SELECTED PUBLICATIONS

Linda Keen and Nikola Lakic, Hyperbolic geometry from a local viewpoint, Cambridge University Press, 2007

F. Gardiner and Nikola Lakic, Comparing Poincare distances, Annals of Mathematics, 2001

MOST RECENT INVITED LECTURES

Section opening lecture, AAA 2023, Vrnjacka Banja, Serbia, June 21-24 2023

Plenary lecture, AAA 2024, Vrnjacka Banja, Serbia, July 2024

PROFESSIONAL TRAINING

CUNY Certification for online teaching	2002
CUNY License for online teaching	2017

LEHMAN COLLEGE

CURRICULUM VITAE

Name:
Chen-Yun Lin

Date Submitted:

RECOMMENDATION FOR:

APPOINTMENT PROMOTION _____

_____

REAPPOINTMENT REAPPOINTMENT WITH TENURE _____

_____

OTHER (Sabbatical Leave, Designation ECP, etc.) _____

TITLE __Assistant Professor___ DEPARTMENT_____Mathematics_____

EFFECTIVE DATE SALARY RATE _____

_____

Initial Appointment Date
__2019/08/01_____

Tenure Date _____

HIGHER EDUCATION (in reverse chronological order)

Institution	Dates Attended	Degree & Major	Date Conferred
Columbia University	2005-2010	PhD, Math	2010/05/23
National Tsing-Hua University	2000-2004	BS, Math	2004/06/30

EXPERIENCE (in reverse chronological order)

A. Teaching (at Lehman and any other institutions)

Institution	Dates	Rank	Department
Lehman College	2019-2022	Assistnat Professor	Math
Duke University	2017-2019	Postdoc	Math
University of Toronto	2015-2017	Postdoc	Math
National Taiwan University	2013-2015	Assistant Professor	Math
University of Connecticut	2010-2013	Postdoc	Math

B. Employment/Others

Employer/ Institution	Dates	Position/ Rank	Department/Unit
Lehman College	2019-2022	Assistnat Professor	Math
Duke University	2017-2019	Postdoc	Math
University of Toronto	2015-2017	Postdoc	Math
National Taiwan University	2013-2015	Assistant Professor	Math
University of Connecticut	2010-2013	Postdoc	Math
National Center for Theoretical Sciences	2004-2005	Research Assistant	Math

ACADEMIC AND PROFESSIONAL HONORS
(since last personnel action, with dates received, in reverse chronological order)

- PSC-CUNY Trad A Award, 2022/04/15
- PSC-CUNY Trad A Award, 2021/04/15
- PSC-CUNY Trad A Award, 2020/04/15

ACADEMIC AND PROFESSIONAL HONORS
(prior to last personnel action, with dates received, in reverse chronological order)

- International Consortium of Chinese Mathematicians Best Paper Award, 2018

PUBLICATIONS/CREATIVE WORKS
(since last personnel action, in reverse chronological order)

Peer-Reviewed

- Unexpected sawtooth artifact in beat-to-beat pulso transit time measured from patient monitor data

Non-Peer-Reviewed
N/A

PUBLICATIONS / CREATIVE WORKS
(prior to last personnel action, in reverse chronological order)

Peer-Reviewed

- Manifold learning via the principal bundle approach, 2018
- Wave-shape function analysis – when cepstrum meets time-frequency analysis, 2018
- Embedding of Riemannian manifolds with finite eigenvector fields of connection Laplacian, 2018
- Bartnik's mass and Hamilton's modified Ricci flow, 2016
- On isometric embeddings into anti-de Sitter space-times, 2015
- Parabolic constructions of asymptotic flat 3-metrics of prescribed differential equations, 2014

Non-Peer-Reviewed
- N/A

PRESENTATIONS (since last personnel action, in reverse chronological order)

- Undergraduate research recruitment, Lehman and City Colleges, 2022
- the 3rd Geometric Analysis Festival, 2021
- Undergraduate research recruitment, Lehman College, 2021

- Undergraduate research recruitment, Lehman College, 2020
- the MAA annual meeting of the New York region, 2020
- Geometric Analysis Seminar at the CUNY Graduate Center, 2019

PRESENTATIONS (prior to last personnel action, in reverse chronological order)

- Pacific Northwest Geometry Seminar, 2019
- Colloquium, Iowa State University, 2019
- Computational and Applied Mathematics Seminar, Iowa State University, 2018
- Geometry Seminar, Dartmouth College, 2018
- Geometric Analytic workshop, CUNY, 2018
- Daubechies64 conference, Belgium, 2018
- TRIPODS southwest summer conference, AZ, USA, May 23, 2018
- Manifold Learning in Modern Signal Processing, 42nd SIAM Southeastern Atlantic Sectional Conference, 2018
- Differential and Metric Geometry and Geometric Analysis, Joint Mathematical Meetings, 2018
- Geometry & Topology Seminar, Duke University, 2017
- PDE and Applied Math Seminar, UC Riverside, 2017
- Differential Geometry Seminar, UC Riverside, 2017
- Geometric Analysis Seminar, McGill University, 2017
- Geometric Analysis and General Relativity, AMS Sectional Meeting, 2017
- Modeling and Computational Science Seminar, ON, Canada, 2016
- SIAM conference on Imaging Science, NM, USA, 2016
- Data Science Seminar, Institute for Mathematics and its Applications, MN, USA, 2016
- Differential Geometry Seminar, The City University of New York, 2016
- AMS Sectional Meeting, Stony Brook University, 2016
- Workshop on Current Progress in Time Frequency Analysis and Its Applications, National Cheng Kung University, Taiwan, 2015
- Workshop of Biomedical Signal Processing Techniques, National Tsing Hua University, Taiwan, 2015
- General Relativity and Geometric Analysis Reading Seminar, Columbia University, 2015
- Inverse Problems and Image Analysis Seminar, The Fields Institute, 2015

PH.D. DISSERTATION/THESIS TITLE:

- On Hamilton's Ricci flow and black hole initial data

UNPUBLISHED WORK
(Supported by evidence, including unpublished Ph.D. or Master's Thesis)

a. Works accepted for publication/Exhibition/Production
N/A

b. Works submitted for publication, exhibition and production
- *Almost Isometric Embeddings Via Heat Kernels of Connection Laplacians* to the journal, La Matematica.

c. Works in progress

- Manuscripts in preparation

    - *On Spectral Representations and Distances Between Two Surfaces*
    - *Survey on Spectral Methods for Manifold Learning and Morphometrics*

- Research in progress

    - Embedding manifolds by the eigenfunctions of the Laplace-Beltrami operator - we consider closed manifolds with no curvature bounds and study embeddings of these manifolds with their heat kernels and eigenfunctions, with non-trivial examples.

- Exhibitions / Productions in preparation

  N/A

GRANTS

- Current
    - PSC-CUNY Trad A Award, 2022
    - PSC-CUNY Trad A Award, 2021
    - PSC-CUNY Trad A Award, 2020

- Completed
    - National Science Council, NSC grant, 2018
    - Travel grant to the Women's Program in General Relativity funded by MSRI, 2013
    - Travel grant for the Differential Geometry Seminar funded by the Department of Mathematics, University of Miami, 2012
    - Travel grant funded by The Mathematics Research Communities, 2009-2010
    - Graduate Fellowship, Columbia University, 2005-2010

- Applied but not funded

N/A

SERVICE TO DEPARTMENT

a. **Educational Policy Committee**. The committee has developed the Department's Statistics Minor.

b. **Applied Mathematics Coursework.** I took over the Department's Mathematical Statistics class while a faculty member was on family leave and will continue overseeing this course during the 2021-2022 semester and possible develop a follow-up course.

SERVICE TO SCHOOL

N/A

SERVICE TO LEHMAN COLLEGE

N/A

SERVICE TO CUNY

a. CUNY Common Core Course Review Committee. I was nominated and elected to serve on this university-wide committee which reviews potential QR-pathways courses across the CUNY system. The length of service is 2 years

b. Student Research Team Leader. I am the research team leader for a group working at the CUNY Graduate Center in the areas of spectral graph theory, spectral geometry, and the manifold learning problem. organize regular meetings and assigns follow-up work to the group and write letters of recommendations for students.

SERVICE TO THE PROFESSION

N/A

COMMUNITY SERVICE

a. **Friends of 4 Parks**. I volunteer and help organize/fundraise for free events for children, adults, and pets in her neighborhood in the south Bronx. This work is my personal passion. I believe that if people are in an uplifting environment, then success would come more naturally and easily.

TEACHING

A. COURSES TAUGHT

Course Code	Course Title	Semester First Taught	Lehman or GC
MAT175 02	Calculus I	Fall 2019	Lehman
MAT 175 I401	Calculus I	Fall 2019	Lehman
MAT 176 01	Calculus II	Spring 2020	Lehman
MAT175 A81	Calculus I	Fall 2020	Lehman
MAT226 A01	Vector Calculus	Fall 2020	Lehman
MAT328	Techniques in Data Science	Spring 2021	Lehman
MAT226 A01	Vector Calculus	Spring 2021	Lehman
MAT327/782	Statistical Inference	Fall 2021	Lehman
MAT226 H81	Vector Calculus	Fall 2021	Lehman
MAT175 ZF81	Calculus I	Spring 2022	Lehman
MAT226 01	Vector Calculus	Spring 2022	Lehman
PHYS 30100	Honors	Spring 2022	City College

B. <u>STUDENT EVALUATIONS</u> (since last personnel action, in reverse chronological order; excerpts of representative comments may be attached as a separate document)

Course	Semester	SETL 5.1 mean	SETL 5.1 median	SETL 5.2 mean	SETL 5.2 median	Number of responses
MAT226 01	Spring 2022	1.5	1.5	2	2	2
MAT175 ZF81	Spring 2022	2.25	2	2.13	1.51	8
MAT226 H81	Fall 2021	1.5	1	1.8	2	9
MAT327/782	Fall 2021	2.67	2.5	2.17	2	6
MAT226 A01	Spring 2021	1.5	1	1.8	2	10
MAT175 A81	Fall 2020	1.38	1	1.29	1	8
MAT226 A 01	Fall 2020	1.75	1.5	1.75	1.5	4
MAT 176 01	Spring 2020					
MAT 175 I401	Fall 2019	2.5	2.5	2.7	2.5	10
MAT175 02	Fall 2019	3.88	4.5	3.75	4	8

CURRICULUM VITAE

MELVYN B. NATHANSON

Education:

University of Rochester, Mathematics, M.A. (1968), Ph.D. (1972)
Harvard University, Biophysics, 1965-66
University of Pennsylvania, Philosophy, B.A. (1965)

Employment:

1986-	Professor of Mathematics Lehman College (CUNY) and the CUNY Graduate Center
1986-91	Provost and Vice President for Academic Affairs, Lehman College Professor of Mathematics, Lehman College and the Graduate Center
1981-86	Dean of the Graduate School and Professor of Mathematics, Rutgers-Newark, and Graduate Faculty in Mathematics, Rutgers-New Brunswick
1971-81	Southern Illinois University, Carbondale Professor of Mathematics (1979-81) Associate Professor (1975-79) Assistant Professor (1972-75) Instructor (1971-72)

Honors:

Fellow of the American Mathematical Society (AMS)
Medal of the Institute for Advanced Study, Princeton
Lehman College Award for Excellence in Research

Publications (see attached list):

Author of over 200 research papers in mathematics
Author/editor of 27 books, including these Springer Graduate Texts:
Additive Number Theory: The Classical Bases
Additive Number Theory: Inverse Problems and the Geometry of Sumsets
Elementary Methods in Number Theory

Related Activities:

Organizer of the New York Number Theory Seminar, 1982–present.
President of the Association of Members of the Institute for Advanced Study (AMIAS), 1998-2017.
Service on the AMS Committee on Human Rights (chair), AMS Committee on Science Policy, and AMS Committee on Translations.
Organizer of the annual Workshops on Combinatorial and Additive Number Theory at the CUNY Graduate Center
Organizer of the DIMACS conference Unusual Applications of Number Theory

Visiting Positions:

1970	Lent and Easter terms, University of Cambridge Department of Pure Mathematics and Mathematical Statistics
1972-1973	Moscow State University, Faculty of Mechanics and Mathematics IREX fellowship with I. M. Gelfand
1974-1975	Institute for Advanced Study Assistant to Andre Weil in the School of Mathematics
1975-1976	Rockefeller University (with Mark Kac and Morris Schreiber) and Brooklyn College (CUNY)
1977-1978	Harvard University, Department of Mathematics and Kennedy School of Government, Program in Science and International Affairs
1990-1991	Institute for Advanced Study, School of Mathematics
1999-2000	Institute for Advanced Study, School of Mathematics
2000-2001	Tel Aviv University, Visiting Professor of Mathematics
Fall, 2007	Institute for Advanced Study, School of Mathematics
Fall, 2008	Princeton University, Department of Mathematics

Melvyn B. Nathanson: Books

Monographs

(1) *Additive Number Theory: The Classical Bases*, Graduate Texts in Mathematics, Vol. 164, Springer-Verlag, New York, 1996.

(2) *Additive Number Theory: Inverse Problems and the Geometry of Sumsets*, Graduate Texts in Mathematics, Vol. 165, Springer-Verlag, New York, 1996.

(3) *Elementary Methods in Number Theory*, Graduate Texts in Mathematics, Vol. 195, Springer-Verlag, New York, 2000.

Proceedings

(4) *Number Theory Day: Proceedings of the Conference held at Rockefeller University, New York, March 4, 1976*, Edited by M. B. Nathanson, Lecture Notes in Mathematics, Vol. 626, Springer-Verlag, Berlin, 1977.

(5) *Number Theory, Carbondale 1979: Proceedings of the Southern Illinois Number Theory Conference, held at Southern Illinois University, Carbondale, Ill., March 30–31, 1979*, Edited by M. B. Nathanson, Lecture Notes in Mathematics, Vol. 751, Springer, Berlin, 1979.

(6) *Number Theory: Proceedings of the seminar held at the City University of New York, New York, 1982*, Edited by D. V. Chudnovsky, G. V. Chudnovsky, H. Cohn, and M. B. Nathanson, Lecture Notes in Mathematics, Vol. 1052, Springer-Verlag, Berlin, 1984.

(7) *Number Theory: Proceedings of the seminar held at the City University of New York, New York, 1983–1984*, Edited by D. V. Chudnovsky, G. V. Chudnovsky, H. Cohn, and M. B. Nathanson, Lecture Notes in Mathematics, Vol. 1135, Springer-Verlag, Berlin, 1985.

(8) *Number Theory: Proceedings of the seminar held at the City University of New York, New York, 1984–1985*, Edited by D. V. Chudnovsky, G. V. Chudnovsky, H. Cohn, and M. B. Nathanson, Lecture Notes in Mathematics, Vol. 1240, Springer-Verlag, Berlin, 1987.

(9) *Number Theory: Proceedings of the seminar held at the City University of New York, New York, 1985–1988*, Edited by D. V. Chudnovsky, G. V. Chudnovsky, H. Cohn, and M. B. Nathanson, Lecture Notes in Mathematics, Vol. 1383, Springer-Verlag, Berlin, 1989.

(10) *Number Theory: Papers from the seminar held at the City University of New York, New York, 1989–1990*, Edited by D. V. Chudnovsky, G. V. Chudnovsky, H. Cohn, and M. B. Nathanson, Springer-Verlag, New York, 1991

(11) *Number Theory: Papers from the seminars held at the City University of New York, New York, 1991–1995*, Edited by D. V. Chudnovsky, G. V. Chudnovsky, and M. B. Nathanson, Springer-Verlag, New York, 1996.

(12) *Number Theory: Papers from the seminar (NYNTS) held at the City University of New York, New York, 2003*, Edited by D. V. Chudnovsky, G. V. Chudnovsky, and M. B. Nathanson, Springer-Verlag, New York, 2004.

(13) *Unusual Applications of Number Theory: Proceedings of the DIMACS Workshop held at Rutgers University, January 10–14, 2000*, Edited by M.B.

Nathanson, DIMACS Series in Discrete Mathematics and Theoretical Computer Science, Vol. 64, American Mathematical Society, Providence, RI, 2004.

(14) *Combinatorial Number Theory*, Edited by B. M. Landman, M. B. Nathanson, J. Nešetřil, R. J. Nowalowski, and C. Pomerance, De Gruyter Proceedings in Mathematics, de Gruyter, Berlin, 2007

(15) *Additive Combinatorics*, Edited by A. Granville, M. B. Nathanson, and J. Solymosi, Amer. Math. Soc., Providence, 2007.

(16) *Combinatorial Number Theory*, Edited by B. M. Landman, M. B. Nathanson, J. Nešetřil, R. J. Nowakowski, C. Pomerance, and A. Robertson, de Gruyter, Berlin, 2009

(17) *Combinatorial and Additive Number Theory*, Edited by M. B. Nathanson, Springer Proceedings in Mathematics and Statistics, vol. 101, Springer, New York, 2014.

(18) *Combinatorial and Additive Number Theory II*, Edited by M. B. Nathanson, Springer Proceedings in Mathematics and Statistics, vol. 220, Springer, New York, 2017.

(19) *Combinatorial and Additive Number Theory III*, Edited by M. B. Nathanson, Springer Proceedings in Mathematics and Statistics, vol. 297, Springer, New York, 2020.

(20) *Combinatorial and Additive Number Theory IV*, Edited by M. B. Nathanson, Springer Proceedings in Mathematics and Statistics, vol. 347, Springer, New York, 2021.

(21) *Number Theory and Combinatorics*, Edited by B. Landman, F. Luca, M. Nathanson, J. Nešetřil, and A. Robertson, de Gruyter, Berlin, Boston, 2022.

(22) *Combinatorial Game Theory*, Edited by R. J. Nowalowski, B. Landman, F. Luca, M. B. Nathanson, J. Nešetřil, and A. Robertson, de Gruyter, Berlin, Boston, 2022.
https://doi.org/10.1515/9783110755411

(23) *Combinatorial and Additive Number Theory V*, Edited by M. B. Nathanson, Springer Proceedings in Mathematics and Statistics, vol. 395, Springer, New York, 2022.

Translations

(24) Anatolij A. Karatsuba, *Basic Analytic Number Theory*, Translated from the second (1983) Russian Edition and with a preface by Melvyn B. Nathanson, Springer-Verlag, Berlin, 1993.

(25) Grigori Freiman, *It Seems I am a Jew: A Samizdat Essay on Soviet Mathematics*, Translated from the Russian and with an introduction by Melvyn B. Nathanson and appendices by Melvyn B. Nathanson and Andrei Sakharov, Southern Illinois University Press, Carbondale, 1979.

Other

(26) *Komar/Melamid: Two Soviet Dissident Artists*, Southern Illinois University Press, Carbondale, 1979.

(27) *Nuclear Nonproliferation: The Spent Fuel Problem* (Pergamon policy studies on energy and environment), co-authored with the Harvard University Nuclear Nonproliferation Study Group, Pergamon Press, 1979.

Melvyn B. Nathanson: Essays

(1) Introduction to: *Komar/Melamid: Two Soviet Dissident Artists*, Southern Illinois University Press, Carbondale, 1979.
(2) Introduction to: Grigori Freiman, *It Seems I am a Jew: A Samizdat Essay on Soviet Mathematics*, Southern Illinois University Press, Carbondale, 1980.
(3) "It takes time and money to grow Nobel laureates," *The New York Times*, November 15, 1981.
(4) Review of *Gauss: A Biographical Study*, W. K. Bühler, Mathematical Intelligencer 4 (1982), 208–209.
(5) "Schools and the Draft: A Bad Tie," *The New York Times*, February 28, 1983, p. A15
(6) "Orwell and the atom bomb," *Bulletin of the Atomic Scientists*, April, 1984, p. 4.
(7) "Controlling Science Information: Who's in Charge?" *CHANGE: The Magazine of Higher Learning*, January/February, 1985
(8) "Academic freedom versus nonproliferation: The Libyan case," *Bulletin of the Atomic Scientists*, March, 1985, 29–31.
(9) "Soviet reactors to open for international inspection," *Bulletin of the Atomic Scientists*, June/July, 1985, 32–33.
(10) "Success at the NPT Review Conference," *Bulletin of the Atomic Scientists*, February, 1986, p. 48.
(11) "Tennenbaum at Penn and Rochester," *Integers*, 8 (2) (2008), 1–4.
(12) "Desperately Seeking Mathematical Truth," *Notices of the American Mathematical Society*, 55, no. 7 (2008), 773.
(13) "Desperately Seeking Mathematical Proof," *Mathematical Intelligencer*, 31, no. 2 (2009), 8–10; reprinted in:
The Best Writing on Mathematics 2010, Princeton University Press, 2011
(14) "Addictive Number Theory," in *Additive Number Theory: Festschrift in Honor of the Sixtieth Birthday of Melvyn B. Nathanson*, edited by David Chudnovsky and Gregory Chudnovsky, Springer, New York, 2010, pp.1–8.
(15) "One, Two, Many: Individuality and Collectivity in Mathematics," *Mathematical Intelligencer*, 33, no. 1 (2011), 5–8; reprinted in:
The Best Writing on Mathematics 2011, Princeton University Press, 2012.
(16) "An American mathematician in Moscow, or how I destroyed the Soviet Union," *Notices of the American Mathematical Society* 61 (2014), 186–189.
(17) "The Erdős paradox," in: *Combinatorial and Additive Number Theory II*, Springer, New York, 2017, pp. 249–254; reprinted in:
The Best Writing on Mathematics 2019, Princeton University Press, 2019.
(18) "Who owns the theorem?" European Mathematical Society Newsletter, December, 2020 ; reprinted in:
The Best Writing on Mathematics 2021, Princeton University Press, 2022.

Melvyn B. Nathanson: Mathematics Papers

1971

(1) Derivatives of binary sequences, SIAM Journal of Applied Mathematics 21 (1971), 407–412.
(2) Difference operators on sequences over groups, Ph.D. thesis, University of Rochester, 1971, ProQuest LLC, Ann Arbor, MI.

1972

(3) An exponential congruence of Mahler, American Mathematical Monthly 79 (1972), 55–57.
(4) On the greatest order of an element in the symmetric group, American Mathematical Monthly 79 (1972), 500–501.
(5) Complementing sets of n-tuples of integers, Proceedings of the American Mathematical Society 34 (1972), 71–72.
(6) Shift dynamical systems over finite fields, Proceedings of the American Mathematical Society 34 (1972), 591–594.
(7) Sums of finite sets of integers, American Mathematical Monthly 79 (1972),1010–1012
(8) Integrals of binary sequences, SIAM Journal of Applied Mathematics 23 (1972), 84–86.

1973

(9) On the fundamental domain of a discrete group, Proceedings of the American Mathematical Society 41 (1973), 629–630.

1974

(10) Catalan's equation in $K(t)$, American Mathematical Monthly 81 (1974), 371–373.
(11) Minimal bases and maximal nonbases in additive number theory, Journal of Number Theory 6 (1974), 324–333.
(12) Approximation by continued fractions, Proceedings of the American Mathematical Society 45 (1974), 323–324.

1975

(13) Maximal asymptotic nonbases (with P. Erdős), Proceedings of the American Mathematical Society 48 (1975), 57–60.
(14) Products of sums of powers, Mathematics Magazine 48 (1975), 112–113.
(15) Linear recurrences and uniform distribution, Proceedings of the American Mathematical Society 48 (1975), 289–291.
(16) An algorithm for partitions, Proceedings of the American Mathematical Society 52 (1975), 121–124
(17) Oscillations of bases for the natural numbers (with P. Erdős), Proceedings of the American Mathematical Society 53 (1975), 253–258
(18) Round metric spaces, American Mathematical Monthly 82 (1975), 738–741.

(19) Essential components in discrete groups, American Mathematical Monthly 82 (1975), 834

1976

(20) Polynomial Pell's equations, Proceedings of the American Mathematical Society 56 (1976), 89–92.
(21) Partial products in finite groups, Discrete Mathematics 15 (1976), 201–203.
(22) Partitions of the natural numbers into infinitely oscillating bases and nonbases (with P. Erdős), Comment. Math. Helv. 51 (1976), 171–182.
(23) Piecewise linear functions with almost all points eventually periodic, Proceedings of the American Mathematical Society 60 (1976), 75–81.
(24) Difference operators and periodic sequences over finite modules, Acta Math. Acad. Sci. Hungar. 28 (1976), 219–224.
(25) Mellin's formula and some combinatorial identities (with S. Chowla), Monatsh. Math. 81 (1976), 261–265.
(26) Prime polynomial sequences (with S. D. Cohen and P. Erdős), Journal of the London Mathematical Society (2) 14 (1976), 559–562.

1977

(27) Permutations, periodicity, and chaos, Journal of Combinatorial Theory Series A 22 (1977), 61–68.
(28) s-maximal nonbases of density zero, Journal of the London Mathematical Society (2) 15 (1977), 29–34.
(29) Nonbases of density zero not contained in maximal nonbases (with P. Erdős), Journal of the London Mathematical Society (2) 15 (1977), 403–405.
(30) Asymptotic distribution and asymptotic independence of sequences of integers, Acta Math. Acad Sci. Hungar. 29 (1977), 207–218.
(31) Oscillations of bases in number theory and combinatorics, in: *Number theory day (Proc. Conf., Rockefeller Univ., New York, 1976)*, Lecture Notes in Math., Vol. 626, Springer, Berlin, 1977, pages 217–231.

1978

(32) Multiplication rules for polynomials, Proceedings of the American Mathematical Society 69 (1978), 210–212.
(33) Sets of natural numbers with no minimal asymptotic bases (with P. Erdős), Proceedings of the American Mathematical Society 70 (1978), 100–102.
(34) Monomial congruences, Monatsh. Math. 85 (1978), 199–200.
(35) Representation functions of sequences in additive number theory, Proceedings of the American Mathematical Society 72 (1978), 16–20.

1979

(36) Bases and nonbases of square-free integers (with P. Erdős), Journal of Number Theory. 11 (1979), 197–208.
(37) Additive h-bases for lattice points, in: *Second International Conference on Combinatorial Mathematics (New York, 1978)*, Ann. New York Acad. Sci. 319 (1979), 413–414.

(38) Systems of distinct representatives and minimal bases in additive number theory (with P. Erdős), in: *Number theory, Carbondale 1979 (Proc. Southern Illinois Conf., Southern Illinois Univ., Carbondale, Ill., 1979)*, Lecture Notes in Mathematics, Vol. 751, Springer, Berlin, 1979, pages 89–107.

(39) Classification problems in K-categories, Fund. Math. 105 (1979/80), 187–197.

1980

(40) Sumsets of measurable sets, Proceedings of the American Mathematical Society 78 (1980), 59–63.

(41) Connected components of arithmetic graphs, Monatshefte Math. 89 (1980), 219–222.

(42) Minimal asymptotic bases for the natural numbers (with P. Erdős), Journal of Number Theory 12 (1980), 154–159.

(43) Sumsets contained in infinite sets of integers, Journal of Combinatorics Theory Series A 28 (1980), 150–155.

(44) Lagrange's theorem with $N^{1/3}$ squares (with S. L. G. Choi and P. Erdős), Proceedings of the American Mathematical Society 79 (1980), 203–205.

(45) Arithmetic progressions contained in sequences with bounded gaps, Canadian Mathematical Bulletin 23 (1980), 491–493.

1981

(46) Waring's problem for sets of density zero, in: *Analytic number theory (Philadelphia, Pa., 1980)*, Lecture Notes in Mathematics, Vol. 899, Springer, Berlin, 1981, pages 301–310.

(47) Lagrange's theorem and thin subsequences of squares (with (P. Erdős), in: *Contributions to Probability*, Academic Press, New York, 1981, pages 3–9.

1982

(48) Review of *Gauss: A Biographical Study*, W. K. Bühler, Mathematical Intelligencer 4 (1982), 208–209.

1983

(49) Largest and smallest maximal sets of pairwise disjoint partitions, Journal of Number Theory 17 (1983), 103–112.

1984

(50) The exact order of subsets of additive bases, in: *Number Theory (New York, 1982)*, Lecture Notes in Math., Vol. 1052, Springer, Berlin, 1984, pages 273–277.

1985

(51) Cofinite subsets of asymptotic bases for the positive integers (with J. C. M. Nash), Journal of Number Theory 20 (1985), 363–372.

1986

(52) Divisibility properties of additive bases, Proceedings of the American Mathematical Society 96 (1986), 11–14
(53) Waring's problem for finite intervals, Proceedings of the American Mathematical Society 96 (1986), 15–17.
(54) Independence of solution sets in additive number theory (with P. Erdős), in: *Probability, statistical mechanics, and number theory*, Adv. Math. Suppl. Stud., Vol. 9, Academic Press, Orlando, FL, 1986, pages 97–105.

1987

(55) A short proof of Cauchy's polygonal number theorem, Proceedings of the American Mathematical Society 99 (1987), 22–24
(56) An extremal problem for least common multiples, Discrete Mathematics 64 (1987), 221–228.
(57) Multiplicative representations of integers, Israel Journal of Mathematics 57 (1987), 129–136.
(58) Thin bases in additive number theory, in: *Journées Arithmétiques de Besançon (Besançon, 1985)*, Astérisque 147-148 (1987), 315–317, 345.
(59) Problems and results on minimal bases in additive number theory (with P. Erdős), in: *Number Theory (New York, 1984–1985)*, Lecture Notes in Mathematics, Vol. 1240, Springer, Berlin, 1987, pages 87–96.
(60) A generalization of the Goldbach-Shnirel'man theorem, American Mathematical Monthly 94 (1987), 768–771.
(61) Sums of polygonal numbers, in: *Analytic number theory and Diophantine problems (Stillwater, OK, 1984)*, Progr. Math., Vol. 70, Birkhäuser Boston, Boston, 1987, pages 305–316.

1988

(62) Sumsets containing infinite arithmetic progressions (with P. Erdős and A. Sárközy), Journal of Number Theory 28 (1988), 159–166.
(63) Partitions of bases into disjoint unions of bases (with P. Erdős), Journal of Number Theory 29 (1988), 1–9.
(64) Minimal asymptotic bases with prescribed densities (with P. Erdős), Illinois Journal of Math. 32 (1988), 562–574.
(65) Simultaneous systems of representatives for families of finite sets, Proceedings of the American Mathematical Society 103 (1988), 1322–1326.
(66) Minimal bases and powers of 2, Acta Arithmetica 49 (1988), 525–532.

1989

(67) On the maximum density of minimal asymptotic bases (with A. Sárközy), Proceedings of the American Mathematical Society 105 (1989), 31–33.
(68) A simple construction of minimal asymptotic bases (with X.-D. Jia), Acta Arithmetica 52 (1989), 95–101.
(69) Sumsets containing k-free integers, in *Number Theory (Ulm, 1987)*, Lecture Notes in Mathematics, Vol. 1380, Springer, New York, 1989, pages 179–184.

(70) Combinatorial pairs, and sumsets contained in sequences, in: *Combinatorial Mathematics: Proceedings of the Third International Conference (New York, 1985)*, Ann. New York Acad. Sci. 555 (1989), 316–319.
(71) Additive problems in combinatorial number theory, in: *Number Theory (New York, 1985/1988)*, Lecture Notes in Mathematics, Vol. 1383, Springer, Berlin, 1989, pages 123–139.
(72) Sumsets containing long arithmetic progressions and powers of 2 (with A. Sárközy), Acta Arithmetica 54 (1989), 147–154.
(73) Long arithmetic progressions and powers of 2, in: *Théorie des nombres (Quebec, PQ, 1987)*, de Gruyter, Berlin, 1989, pages 735–739.
(74) Additive bases with many representations (with P. Erdős), Acta Arithmetica 52 (1989), 399–406.
(75) Two applications of combinatorics to number theory, in: *Graph theory and its applications: East and West (Jinan, 1986)*, Ann. New York Acad. Sci. 576 (1989), 408–410.

1990

(76) Simultaneous systems of representatives and combinatorial number theory, Discrete Mathematics 79 (1990), 197–205.
(77) Extremal properties for bases in additive number theory, in: *Number Theory, Vol. I (Budapest, 1987)*, Colloq. Math. Soc. János Bolyai, Vol. 51, North-Holland, Amsterdam, 1990, pages 437–446.
(78) Best possible results on the density of sumsets, in: *Analytic number theory (Allerton Park, IL, 1989)*, Progr. Mathematics, Vol. 85, Birkhäuser Boston, Boston, 1990, pages 395–403.

1992

(79) On a problem of Rohrbach for finite groups, Journal of Number Theory 41 (1992), 69–76

1993

(80) The simplest inverse problems in additive number theory, in: *Number theory with an emphasis on the Markoff spectrum (Provo, UT, 1991)*, Lecture Notes in Pure and Appl. Mathematics, Vol. 147, Dekker, New York, 1993, pages 191–206

1994

(81) An inverse theorem for sums of sets of lattice points, Journal of Number Theory 46 (1994), 29–59
(82) Addition theorems for σ-finite groups (with X.-D. Jia), in: *The Rademacher legacy to mathematics (University Park, PA, 1992)*, Contemporary Mathematics, Vol. 166, American Mathematical Society, Providence, RI, 1994, pages 275–284.

1995

(83) Inverse theorems for subset sums, Transactions of the American Mathematical Society 347 (1995), 1409–1418.
(84) Independence of solution sets and minimal asymptotic bases (with P. Erdős and P. Tetali), Acta Arithmetica 69 (1995), 243–258.
(85) Adding distinct congruence classes modulo a prime (with N. Alon and I. Z. Ruzsa), American Mathematical Monthly 102 (1995), 250–255.

1996

(86) The polynomial method and restricted sums of congruence classes (with N. Alon and I. Z. Ruzsa), Journal of Number Theory 56 (1996), 404–417.
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Employment/Education

2021- present Associate Professor, Department of Mathematics, Lehman College, City University of New York (CUNY)

2017 - 2021 Assistant Professor, Department of Mathematics, Lehman College, City University of New York (CUNY)

2014 - 2017 Assistant Professor, Department of Mathematics and Computer Science, Lehman College, City University of New York (CUNY)

2014 - present Visiting Scholar, American Museum of Natural History

2011 - 2013 Fields-Ontario Postdoctoral Fellow, Fields Institute and University of Waterloo
Mentor: Anna Lubiw

2010 - 2011 des Jardins Postdoctoral Fellow in Mathematical Biology, Department of Mathematics, University of California, Berkeley
Mentors: Lior Pachter, Bernd Sturmfels

2008 - 2010 Postdoctoral Fellow, Statistical and Applied Mathematical Sciences Institute and North Carolina State University
Mentor: Seth Sullivant

2008 Ph.D. Applied Mathematics, Cornell University
Thesis: Distance Computation in the Space of Phylogenetic Trees
Advisor: Louis Billera
Minors: Computer Science and Mathematics

2007 M.S. Applied Mathematics, Cornell University

2003 B.Sc. Mathematics and Engineering (Computing and Communications Option), Queen's University, Canada

Grants

2020-2021 PSC-CUNY Research Award "Two-sample testing for tree-shaped data" ($5,993)

2019-2024 National Science Foundation CAREER award "Geometric and Statistical Analysis for Tree-Shaped Data" ($412,038)

2017-2018 PSC-CUNY Research Award "Gene tree distributions in tree space" ($5,996)

2015-2018 National Science Foundation Research Experiences for Undergraduates (REU) grant "Interdisciplinary Undergraduate Research in Discrete Mathematical and Computational Biology"; PI: Katherine St. John, co-PI: Megan Owen ($230,602)

2015-2019 Simons Collaboration Grant for Mathematicians "Statistics for Tree-Shaped Data" ($35,000)

2015-2016 PSC-CUNY Research Award "Gene tree distributions in tree space" ($5,953)

Publications

Journals

1. *On the maximum agreement subtree conjecture for balanced trees* (with M. Bordewich, S. Linz, K. St. John, C. Semple, K. Wicke), SIAM Journal on Discrete Mathematics, 36: 336-354, 2022.
2. *Maximum Covering Subtrees for Phylogenetic Networks* (with N. David, A. Hernandez, P. Mckenna, K.A. Medlin, J. Jian, R. Mojumder, A. Quijano, A. Rodriguez, K. St. John, K. Thai, M. Uraga), IEEE/ACM Transactions on Computational Biology and Bioinformatics, 18: 2823-2827, 2020.
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4. *Geometric comparison of phylogenetic trees with different leaf sets* (with G. Grindstaff), SIAM Journal on Applied Algebra and Geometry, 3: 691-720, 2020.
5. *Shortest paths and convex hulls in 2D complexes with non-positive curvature* (with A. Lubiw and D. Maftuleac), Computational Geometry: Theory and Applications, 89: article 101626, 2020.
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7. *Limiting behaviour of Fréchet means in the space of phylogenetic trees* (with D. Barden and H. Le), Annals of the Institute of Statistical Mathematics, 70: 99-129, 2018.
8. *On determining if tree-based networks contain fixed trees* (with M. Anaya, O. Anipchenko-Ulaj, A. Ashfaq, J. Chiu, M. Kaiser, M.S. Ohsawa, E. Pavlechko, K. St. John, S. Suleria, K. Thompson, C. Yap), Bulletin of Mathematical Biology, 78:961-969, 2016.
9. *Polyhedral computational geometry for averaging metric phylogenetic trees* (with E. Miller and S. Provan), Advances in Applied Mathematics, 68: 51-91, 2015.
10. *Geodesic atlas-based labeling of anatomical trees: Application and evaluation on airways extracted from CT* (with A. Feragen, J. Petersen, P. Lo, L, Thomsen, M. Wille, A. Dirksen, M. de Bruijne), IEEE Transactions on Medical Imaging, 34, 1212-1226, 2015.
11. *A note on the unsolvability of the weighted region shortest path problem* (with J.-L. De Carufel, C. Grimm, A. Maheshwari, and M. Smid), Computational Geometry: Theory and Applications, 47: no. 7, 724-727, 2014.
12. *Tree-oriented analysis of brain artery structure* (with S. Skwerer, E. Bullitt, S. Huckemann, E. Miller, I. Oguz, V. Patrangenaru, S. Provan, and J.S. Marron), Journal of Mathematical Imaging and Vision, 50: no. 1-2, 126-143, 2014.
13. *Central Limit Theorems for Fréchet means in the space of phylogenetic trees* (with D. Barden and H. Le), Electronic Journal of Probability, 18: no. 25, 1-25, 2013.
14. *Sticky central limit theorems on open books* (with T. Hotz, S. Huckemann, H. Le, J.S. Marron, J.C. Mattingly, E. Miller, J. Nolen, V. Patrangenaru, S. Skwerer), Annals of Applied Probability, 23: 2238-2258, 2013.

15. *Geodesics in CAT(0) cubical complexes* (with F. Ardila and S. Sullivant), Advances in Applied Mathematics, 48: 142-163, 2012.
16. *A fast algorithm for computing geodesic distances in tree space* (with S. Provan), IEEE/ACM Transactions on Computational Biology and Bioinformatics, 8: 2-13, 2011.
17. *Computing geodesic distances in tree space*, SIAM Journal on Discrete Mathematics, 25: 1506 - 1529, 2011.

Submitted

1. *The space of equidistant phylogenetic cactuses* (with K.T. Huber, V. Moulton, A. Spillner, K. St. John), available at https://arxiv.org/abs/2111.06115
2. *Geodesics to characterize the phylogenetic landscape* (with M. Khodaei and P. Beerli), available at https://www.biorxiv.org/content/10.1101/2022.05.11.491507v1

In Preparation

1. *Estimating bias corrections for phylogenetic trees* (with H. Hoang and A. Willis)
2. *Iterated Principal Component Analysis in Billera-Holmes-Vogtmann Treespace* (with S. Cleary, A. Feragen, and D. Vargas)

Refereed Conference and Workshop Proceedings

1. *Analysis of simulated crowd flow exit data: visualization, panic detection and exit time convergence, attribution and estimation* (with A. Grimm, B. Iskra, N. Ju, A. Kryshchenko, F.P. Medina, L. Ness, M. Ngamini, R. Paffenroth, and S. Tang), Research in Data Science, Springer, pp. 239-281, 2019.
2. *Convex Hulls in 2D Complexes with Non-Positive Curvature* (with A. Lubiw and D. Maftuleac) Electronic Proceedings of the 26th Fall Workshop on Computational and Combinatorial Geometry (FWCG), 2016.
3. *Quantification and visualization of variation in anatomical trees* (with N. Amenta, M. Datar, Dirksen, M. de Bruijne, A. Feragen, X. Ge, J. H. Pedersen, M. Howard, J. Petersen, J. Shi, and Q. Xu), Research in Shape Modeling, pp. 57-79, 2015.
4. *Tree-space statistics and approximations for large-scale analysis of anatomical trees* (with A. Feragen, J. Petersen, A. Dirksen, L. Thomsen, M. Wille, and M. de Bruijne), Proceedings of 23rd biennial International Conference on Information Processing in Medical Imaging (IPMI 2013), pp. 74-85, 2013.
5. *A hierarchical scheme for geodesic anatomical labeling of airway trees* (with A. Feragen, J. Petersen, P. Lo, L. Thomsen, M. Wille, A. Dirksen, and M. de Bruijne) Proceedings of Medical Image Computing and Computer-Assisted Intervention - MICCAI 2012, Part III, 147-155, 2012.
6. *Unsolvability of the weighted region shortest path problem* (with J.-L. De Carufel, C. Grimm, A. Maheshwari, and M. Smid) Proceedings of the 18th European Workshop on Computational Geometry, pp. 65-68, 2012.
7. *First steps toward the geometry of cophylogeny* (with P. Huggins and R. Yoshida) Proceedings of the Second CREST-SBM International Conference “Harmony of Gröbner

Bases and the Modern Industrial Society", 99-116, 2012; available at http://arxiv.org/abs/0809.1908.

8. *Linear Algorithm for Shortest Path Through Select Orthants*
   Electronic Proceedings of the 17th Fall Workshop on Computational and Combinatorial Geometry (FWCG), 2007

Other

1. *Multiple Principal Components Analysis in Tree Space* (with Sean Cleary, Aasa Feragen, and Daniel Vargas), in Mini-Workshop: Asymptotic Statistics on Stratified Spaces, extended abstracts, no. 44, pp. 33-36, 2014.

Presentations

Conference and Workshop Talks

1. Institut Mittag-Leffler conference on Emerging Mathematical Frontiers in Molecular Evolution, Djursholm, Sweden, August 2022
2. Special Session on Combinatorics and Computing, AMS Fall Eastern Sectional Meeting, virtual, October 2020
3. Spring 2020 Discrete Math Day, Albany (virtual), April 2020
4. Statistical Methods for Non-Euclidean Data session, 12th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2019), UK, Dec. 2019
5. Dagstuhl Seminar on Algorithms and Complexity in Phylogenetics, Dagstuhl, Germany, Oct. 2019
6. Invited session on Graphs and Trees in Object Oriented Data Analysis, 4th Conference of the International Society for Non-Parametric Statistics, Salerno, Italy, June 2018
7. Minisymposium on Computational Biology, SIAM Conference on Discrete Mathematics, Denver, CO, June 2018
8. Special Session on The Mathematics of Phylogenetics, AMS Spring Central Sectional Meeting, Columbus, OH, March 2018
9. Minisymposium on Biological Algebraic Statistics, SIAM Conference on Applied Algebraic Geometry, Atlanta, July-Aug. 2017
10. BIRS Workshop on Mathematical Approaches to Evolutionary Trees and Networks, Banff, Canada, Feb. 2017
11. AMS Special Session on Algebraic Statistics (a Mathematics Research Communities Session), Joint Mathematics Meeting, Atlanta, Jan. 2017
12. Minisymposium on Geometric Phylogenetics, SIAM Conference on Life Sciences, Boston, July 2016
13. Invited session on Object Oriented Data Analysis: Tree Structured Data Objects, 3rd Conference of the International Society for Non-Parametric Statistics, Avignon, France, June 2016
14. Minisymposium on Discrete Mathematical Biology , SIAM Conference on Discrete Mathematics, Atlanta, June 2016

15. Special session on Algebraic and Combinatorial Methods in Mathematical Biology, AMS Southeastern Spring Sectional Meeting, Athens, GA, March 2016.
16. Special session on Mathematics of Evolution, AMS Central Fall Sectional Meeting, Chicago, IL, Oct. 2015
17. Minisymposium on Combinatorial Phylogenetics, SIAM Conference on Applied Algebraic Geometry, NIMS Daejeon, South Korea, Aug. 2015.
18. Mathematical and Computational Systematics session, Hennig XXXIV, New York, NY, June 2015
19. Special session on Topics in Computational Topology and Geometry, AWM Research Symposium 2015, College Park, MD, April 2015.
20. OODA-Tree Structured Data Objects session, Conference of the ERCIM Working Group on Computational and Methodological Statistics (ERCIM 2014), Pisa, Italy, Dec. 2014
21. Mini-symposium on Algebraic and Topological Methods in Mathematical Biology, 7th International Symposium on Biomathematics and Ecology: Education and Research, Claremont, CA, Oct. 2014
22. Mini-Workshop: Asymptotic Statistics on Stratified Spaces, Oberwolfach, Germany, Sept.-Oct. 2014.
23. Evolution 2014, Raleigh, NC, June 2014.
24. Morphogenesis, Regeneration, and the Analysis of Shape Workshop, Mathematical Biosciences Institute (MBI), Ohio, Feb. 2014
25. Low-dimensional Structure in High-Dimensional Systems: Topological Data Analysis, SAMSI, Research Triangle Park, NC, Feb. 2014
26. Mathematical Genomics session, CMS Winter Meeting, Ottawa, Canada, Dec. 2013
27. Special session on Applied Combinatorics, Mathematical Congress of the Americas, Guanajuato, Mexico, Aug. 2013
28. Special session on Discrete Methods and Models in Mathematical Biology, AMS Central Section Meeting, Ames, IA, April 2013
29. Special session on Algebraic Combinatorics, AMS Southeastern Section Meeting, Oxford, MS, March 2013
30. Aurora Borealis Combinatorics Workshop, Abisko, Sweden, Dec. 2012
31. Workshop on Geometry and Statistics in Bioimaging: Manifolds and Stratified Spaces, Sønderborg, Denmark, Oct. 2012
32. Mini-symposium on Discrete Mathematical Biology, SIAM Conference on Discrete Mathematics, Halifax, Canada, June 2012
33. Current Topics Workshop: Statistics, Geometry, and Combinatorics on Stratified Spaces Arising from Biological Problems, Mathematical Biosciences Institute (MBI), Ohio, May 2012
34. Algebraic Biology Workshop (ABaCass2012), Cass Field Station, New Zealand, Feb. 2012
35. Discrete Geometry session, CMS Winter Meeting, Toronto, ON, Dec. 2011
36. Workshop on Rigidity and Symmetry, Fields Institute, Toronto, ON, Oct. 2011
37. Conference on Tropical Geometry and Computational Biology, Saarbrücken, Germany, Sept. 2011

38. Special session on Algebraic and Geometric Combinatorics, AMS Southeastern Section Meeting, Statesboro, GA, March 2011
39. Bay Area Discrete Math Day, MSRI, CA, Oct. 2010
40. Evolution 2010, Portland, OR, June 2010
41. Mini-symposium on Discrete Mathematical Biology, SIAM Conference on Discrete Mathematics, Austin, TX, June 2010
42. Geometric and Combinatorial Aspects of Convex Optimization session, CMS Summer Meeting, Fredericton, NB, June 2010
43. Special session on Advances in Algebraic Statistics, AMS Southeastern Section Meeting, Lexington, KY, Mar. 2010
44. Special session on Applicable Algebraic Geometry, AMS Central Section Meeting, Waco, TX, Oct. 2009
45. AWM Workshop for Women Graduate Students and Recent PhDs, 2009 SIAM Annual Meeting, Denver, CO, July 2009
46. Transition Workshop Algebraic Methods in Systems Biology and Statistics, SAMSI, Research Triangle Park, NC, June 2009
47. 2nd Canadian Discrete and Algorithmic Mathematics Conference, Montreal, May 2009
48. Special session on Applications of Algebraic and Geometric Combinatorics, AMS Southeastern Section Meeting, Raleigh, NC, April 2009
49. Tree Thinking Symposium, Cornell University, Ithaca, May 2008
50. Future Directions in Phylogenetic Methods and Models workshop, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, Dec. 2007
51. 7th Fall Workshop on Computational and Combinatorial Geometry (FWCG07), Hawthorne, NY, Nov. 2007
52. Graduate Student Combinatorics Conference 2007 (GSCC07), University of Washington, Seattle, April 2007

Seminar Talks

1. Mathematical Biology Seminar, New Jersey Institute of Technology, September 2022
2. Graduate Student Colloquium, CUNY Graduate Center, March 2022
3. Statistics and Probability Seminar, University of Nottingham (virtual), March 2021
4. Scientific Computing Colloquium, Florida State University (virtual), March 2021
5. New York Combinatorics Seminar, virtual, September 2020
6. Center for Applied Mathematics Colloquium, Cornell University, September 2017
7. Courant Geometry Seminar, New York University (NYU), Oct. 2016
8. Mathematics Colloquium, Queensborough Community College, March 2016
9. Bi-College Math Colloquium (Simons Senior Thesis Colloquium) , Haverford College, March 2015
10. Biological Sciences Research Seminar, Lehman College, Nov. 2014
11. Computer Science and Mathematics Scholarship Program Seminar, Lehman College, March 2014
12. Department of Mathematics and Statistics Colloquium, Queen's University, Oct. 2013

13. Department of Mathematics and Computer Science seminar, Lehman College, City University of New York (CUNY), March 2013
14. Computational Biology Seminar, Science for Life Laboratory and Royal Institute of Technology (KTH), Dec. 2012
15. Bioinformatics Colloquium, University of Texas at El Paso (UTEP), April 2012
16. Center for Applied Mathematics Colloquium, Cornell University, March 2012
17. Seminar in Computing and Software, McMaster University, March 2012
18. Seminar for the Centre for Stochastic Geometry and Advance Bioimaging (CSGB), Aarhus University, Sept. 2011
19. Department of Computer Science Colloquium, University of Copenhagen, August 2011
20. Mathematics Colloquium, Virginia Tech, January 2011
21. 2010 Computational and Genomic Biology Retreat, UC Berkeley, Nov. 2011
22. Computational Biology Seminar, Stanford University, May 2010
23. SUM series, North Carolina State University, April 2010
24. Mathematics Colloquium, University of Florida, Feb. 2010
25. Interdisciplinary Distinguished Seminar Series, North Carolina State University, Jan. 2010
26. Computational Biology Seminar, Duke University, Sept. 2009
27. Mathematical and Computational Biology Seminar, UC Berkeley, Aug. 2009
28. Biomathematics Seminar, North Carolina State University, Feb. 2009
29. Algebra and Combinatorics Seminar, North Carolina State University, Jan. 2009
30. Discrete Combinatorics, Algebra, Topology, and Statistics Seminar, U. of Kentucky, Oct. 2008
31. Combinatorics Seminar, Binghamton University, March 2008
32. Geometric Potpourri Seminar, University of Illinois at Urbana-Champaign, Feb. 2008
33. Discrete Geometry and Combinatorics Seminar, Cornell University, March 2007
34. Math Sciences Colloquium, Cornell University, September 2006
35. Combinatorics Seminar, Binghamton University, March 2006
36. Discrete Geometry and Combinatorics Seminar, Cornell University, Feb 2006

Posters

1. *Mean and Variance of Phylogenetic Trees* (with D. Brown) Topological Structures in Computational Biology, IMA, Minneapolis, Dec. 2013
2. *Averaging Phylogenetic Metric Trees* (with E. Miller and S. Provan) Evolutionary Genomics Workshop, IPAM, Los Angeles, Nov. 2011
3. *Geodesics in CAT(0) Cubical Complexes* (with F. Ardila and S. Sullivant) Algebraic Combinatorixx Workshop, BIRS, Banff, May 2011
4. *Averaging Phylogenetic Metric Trees* (with E. Miller and S. Provan) Opening Workshop Analysis of Object Data, SAMSI, NC, Oct. 2010
5. *Computing the Geodesic Distance between Phylogenetic Trees in Polynomial Time* (with S. Provan) Molecular Evolution and Phylogenetics workshop, SAMSI, NC, April 2009
6. *Distance Computation in the Space of Phylogenetic Trees*, Opening Workshop Algebraic Methods in Systems Biology and Statistics, SAMSI, NC, Sept. 2008

7. *Computing Distance in the Space of Phylogenetic Trees*, AWM Workshop for Women Graduate Students and Recent PhDs, Joint Mathematics Meeting (JMM), San Diego, January 2008

Software

1. *SturmMean:* computes the Fréchet mean and variance of phylogenetic trees
2. *GTP:* finds geodesic distance between phylogenetic trees in polynomial time (with S. Provan)
3. *GeodeMAPS*: computes the geodesic distance between phylogenetic trees in exponential time

Professional Service

Secretary for Discrete Mathematics activity group, Society for Industrial and Applied Mathematics, January 2021-December 2022

Conference Organization and Leadership

Team leader (with A. Feragen) for Dimensionality reduction and visualization of data in tree-spaces group at Women in Shape (WiSh): Modeling Boundaries of Objects in 2- and 3 Dimensions workshop, Institute for Pure and Applied Mathematics (IPAM), Los Angeles, CA, July 2013

Organizer (with S. Huckemann, H. Le, E. Miller, and V. Patrangenaru) for Current Topics Workshop: Statistics, Geometry, and Combinatorics on Stratified Spaces Arising from Biological Problems at Mathematical Biosciences Institute (MBI), Ohio State U, May 2012

Special Session and Minisymposium Organization

Organizer (with C. Grimm) of AWM Workshop at the SIAM Annual Meeting, Portland, OR, July 2018

Organizer (with R. Yoshida) of minisymposium on Biological Algebraic Statistics at the SIAM Conference on Applied Algebraic Geometry, Georgia Tech, Atlanta, July-Aug. 2017

Organizer (with L. Ellwein) of AWM Poster Session at the SIAM Annual Meeting, Pittsburgh, PA, July 2017

Organizer (with K. St. John) of special session on Mathematical Phylogenetics at the AMS Eastern Sectional Meeting, Hunter College CUNY, New York, May 2017

Organizer (with S. Cleary) of special session on Applications of CAT(0) Cube Complexes at the AMS Eastern Sectional Meeting, Rutgers University, NJ, Nov. 2015

Conference Program Committee Member

Conference on Research in Computational Molecular Biology Satellite Workshop on Comparative Genomics (RECOMB-CG), 2014

Journals refereed

Advances in Applied Mathematics, Annals of Statistics, BMC Evolutionary Biology, Bulletin of Mathematical Biology, Computational Geometry: Theory and Applications, Discrete Applied Mathematics, Discrete and Computational Geometry (DCG), IEEE/ACM Transactions on Computational Biology and Bioinformatics (TCBB), IEEE Transactions on Information Theory,

Journal of the American Statistical Association (JASA), Journal of Combinatorial Theory, Series B, Journal of Mathematical Analysis and Applications (JMAA), Journal of Mathematical Imaging and Vision, Journal of the American Statistical Association, Journal of Theoretical Biology (JTB), Methods in Ecology and Evolution, Molecular Biology and Evolution (MBE), PLOS ONE, Proceedings of the American Mathematical Society, SIAM Journal on Applied Algebra and Geometry (SIAGA), SIAM Journal of Discrete Mathematics (SIDMA), SIAM Journal of Optimization (SIOPT), Vietnam Journal of Mathematics

Conferences refereed

28th Annual Fall Workshop on Computational Geometry (FWCG 2018)
45th International Conference and Exhibition on Computer Graphics and Interactive Techniques (SIGGRAPH 2018)
45th International Colloquium on Automata, Languages, and Programming (ICALP 2018)
30th Annual Conference on Neural Information Processing Systems (NIPS 2016)
11th Annual Meeting of the Bioinformatics Italian Society (BITS2014)

Funding agencies service

Panel reviewer for National Science Foundation (2017, 2022), Simons Foundation (2017)
Ad-hoc proposal reviewer for: Marsden Fund, New Zealand (2015, 2017); Netherlands Organisation for Scientific Research (2017)

PhD Defence External Examiner

Gillian Grindstaff (UT Astin, 2021)
Pierre-Louis Antonsanti (Université Paris Cité, 2022)

University Service

Sectional

Steering Committee on Data Science Methods and Applications Minor, Spring 2016 - present

Departmental

Educational Policy Committee (EPC), Fall 2014 - present
Committee on Honors and Prizes, 2016-2017
Programming Methods II course coordinator, Fall 2014 - Spring 2016
National Society for Black Engineers (NSBE), Lehman College Chapter faculty advisor, Fall 2014 -Spring 2015

Selected Fellowships and Awards

AWM Travel Award for AWM Workshop for Women Graduate Students and Recent PhDs at the SIAM Annual Meeting, 2009
AWM Travel Award for AWM Workshop for Women Graduate Students and Recent PhDs at the Joint Mathematics Meeting (JMM), 2008
Cornell Graduate School Fellowship, 2003-2004
NSERC Postgraduate Scholarship A, declined, 2003

Queen's University Chancellor's Scholarship (Grace Adelia Ashbaugh), 1999-2003

Teaching Experience

Instructor (at Lehman College unless otherwise noted)
Techniques in Data Science, Fall 2019, Spring 2021
Foundations of Data Science, Spring 2018, Spring and Fall 2019, Fall 2020
Calculus 1 Lab, Spring 2019
Inferential Statistics (combined undergraduate and graduate), Fall 2018, Spring and Fall 2020
Introduction to Statistics, Fall 2018
Probability, Fall 2017
Preparing for the Technical Interview Seminar, Fall 2017
Data Science (combined undergraduate and graduate), Spring 2017
Operating Systems (combined undergraduate and graduate), Fall 2016
Algorithms in Bioinformatics and Computational Biology, Spring 2016
Programming Methods I, Fall 2014 - Spring 2015, Spring 2017
Programming Methods II, Spring 2014 - Spring 2016
Introduction to Computer Science II, Spring 2012 (University of Waterloo)
Calculus 1 for engineers, Fall 2009 (NCSU)
Calculus I for non-majors, Fall 2007 (Cornell University)
Teaching Assistantships (all Cornell University):
Applicable Algebra (Spring 2008), Introduction to Cryptography (Spring 2007), Introduction to Combinatorics I (Fall 2006), Introduction to Computing Using Java (Fall 2005 and Spring 2006), Multivariable Calculus for Engineers (Spring 2005), Calculus for Engineers (Fall 2004), Fundamental Information Theory (Spring 2004)

Students Mentored/Supervised

CAREER grant research program (virtual) for first year undergraduates, Spring 2021 cohort: Michael Aidoo, Kiaraly Arroyo, Mahfuja Chadni, Aliyah Daisie, Malak Darwish, Donnavan Jackson

CAREER grant research program for first year undergraduates, Spring 2020 cohort: Ana Abreu, Fambougouri Diane, Aissata Diop, Yunes Elgazali, Nord Gilaj, Hypathia Gonzalez, Sabrina Hossain, Gianncarlo Pena

Treespace Research for Undergraduates (REU) 2017-2018 Cohort: Nathan Davidov, Amanda Hernandez, Justin Jian, Patrick McKenna, Karen Medlin, Roadra Mojumder, Andrew Quijano, Amanda Rodriguez, Katherine Thai, Meliza Uraga

Treespace Research for Undergraduates (REU) 2016-2017 Cohort: Zara Adamou, Yulia Alexandr, Jeremy Alexandre, Abigail Banting, Francesca Falzon, Jona Kerluku, Edgar Palaquibay, Arnav Sood, Emre Tetik, Moshiyakh Tokov

Treespace Research for Undergraduates (REU) 2015-2016 Cohort: Maria Anaya, Olga Anipchenko-Ulaj, Aisha Ashfaq, Joyce Chiu, Mahedi Kaiser, Max Shoji Ohsawa, Ella Pavlechko, Shivam Suleria, Keith Thompson, Corrine Yap

Other students (all at Lehman College):

Undergraduates:

Eric Aragundi, Summer 2020 - present
Aaron Medero, Summer 2020 - present
Sophia Barrett, Spring 2020
Rafael Perez, Spring 2020
Josephine Bacgal, Fall 2018 - Fall 2019
Hanh Hoang, Fall 2018 - Fall 2019
Jonah Green, Macaulay Honors Thesis, Spring 2019
Keri Mallari, Spring 2019
Jose Zamora Orellana, Fall 2017 - Spring 2018 (LSAMP student)
Kahalia Stanberry, Fall 2017
Jona Kerluku, Spring 2016 and Fall 2017
Zara Adamou, Spring 2016
Aurora Koch, Summer 2015 - Spring 2016
Christian Aviles, Summer 2015
Ariel Maduro, Fall 2014 (LSAMP student)
Marlon Figueroa, June 2014 - Spring 2016
Daniel Vargas, Summer 2014
David Gabricki, June 2014

Masters:

Carlos Constantine, Spring 2021

Outreach Activities

Workshop in Computer Science for Young Women, University of Waterloo, May 2012
SAMSI/CRSC Undergraduate Workshop, May 2009
SAMSI Two-Day Undergraduate Workshop, Feb. 2009

- Developed and led interactive lab on computing distances between phylogenetic trees.

Expanding Your Horizons (EYH) Conference: one-day conference promoting math, science, and engineering to middle school girls, held at Cornell University

- registration co-chair (2007, 2008)
- workshop leader (2006): Developed and organized workshop on error-correcting codes
- workshop volunteer (2004, 2005)

4-H Career Explorations Conference 2007: workshops for teens at Cornell University
Co-organizer of graduate students' applied mathematics colloquium series: 2004-2008

Professional Development

Participant in Data Science Pedagogy Winter Workshop at Institute for Applied Computational Science, Harvard University, virtual, January 2021

Participant in the workshop Women in Data Science and Mathematics Research Collaboration Workshop (WiSDM) at the Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, Providence, RI, July 2017

Invited participant at the workshop Teaching Discrete and Algebraic Mathematical Biology to Undergraduates, Mathematical Biosciences Institute (MBI), Columbus, OH, July 2013
Office of Faculty Development program (North Carolina State University):
Reading Circle - *What the Best College Teachers Do*, Spring 2010
Office of Postdoctoral Affairs program (North Carolina State University):
Advising as Teaching, April 2009

CURRICULUM VITAE (Fall 2022)

Rob Schneiderman

Professor of Mathematics
Department of Mathematics
Lehman College CUNY
http://comet.lehman.cuny.edu/schneiderman/

Education:

Ph.D., University of California, Berkeley, Mathematics 2001;
Dissertation: *4-dimensional Intersection Numbers of Knots and Links in 3-manifolds*;
Advisor: Robion Kirby.

B. A. (Summa cum Laude), City University of New York, City College, Mathematics 1994.

Employment:

Professor, Department of Mathematics, Lehman College, City University of New York (September 2017-present);

Associate Professor, Department of Mathematics and Computer Science, Lehman College, City University of New York (September 2013-2017);

Assistant Professor, Department of Mathematics and Computer Science, Lehman College, City University of New York (September 2006-2013);

Postdoctoral Lectureship, Department of Mathematics, University of Pennsylvania (July 2005-July 2006);

Courant Instructor/Assistant Professor, Courant Institute of Mathematical Sciences, New York University (September 2002-July 2005);

National Science Foundation Postdoctoral Fellow, (University of California San Diego) and Visiting Postdoctoral Researcher at Max-Planck-Institute, Bonn, Germany (July 2001-July 2002).

Research Interests:

Low-dimensional Topology: The geometry and topology of 3- and 4-dimensional manifolds, homotopy and isotopy invariants of surfaces in 4-manifolds, concordance invariants of knots and links in 3-manifolds.

Publications and preprints:

Introduction to Whitney towers, **To appear in Winter Braids Lecture Notes** (2020)

Clasper concordance, Whitney towers and repeating Milnor invariants, (with J. Conant and P. Teichner) **Submitted preprint** (2020)

Homotopy versus isotopy: spheres with duals in 4-manifolds, (with P. Teichner) **Duke Math. J.** 171(2): 273-325 (1 February 2022)

The group of disjoint 2-spheres in 4-space, (with P. Teichner) **Annals of Mathematics** Vol 190 (2019)

Cochran's beta-invariants via twisted Whitney towers, (with J. Conant and P. Teichner) **Journal of Knot Theory and its Ramifications** Vol. 26 (2017)

Geometric filtrations of string links and homology cylinders, (with J. Conant and P. Teichner) **Quantum Topology** Vol. 7 Issue 2 (2016)

Pulling Apart 2-spheres in 4-manifolds, (with P. Teichner) **Documenta Mathematica** 19 (2014)

Milnor invariants and twisted Whitney towers, (with J. Conant and P. Teichner) **Journal of Topology** 7 (2014), no. 1

Universal quadratic forms and untwisting Whitney towers, (with J. Conant and P. Teichner) **Proceedings of the Freedmanfest**, **G&T Monographs**, 18 (2012)

Whitney tower concordance of classical links, (with J. Conant and P. Teichner) **Geometry and Topology** Vol 16 (2012)

Tree homology and a conjecture of Levine, (with J. Conant and P. Teichner) **Geometry and Topology** Vol 16 (2012)

Can one hear the sound of a theorem?, **Notices of the American Mathematical Society** Vol 58 Issue 07 August (2011), and **Best Writing on Mathematics** Princeton University Press (2013)

Higher-order intersections in low-dimensional topology, (with J. Conant and P. Teichner) **Proceedings of the National Academy of Sciences USA** vol. 108, no. 20, (2011)

Stable concordance of knots in 3-manifolds, **Algebraic and**

Geometric Topology Vol 10 (2010)

Jacobi identities in low-dimensional topology, (with J. Conant and P. Teichner) **Compositio Mathematica** 143 Part 3 (2007)

Whitney towers and gropes in 4-manifolds, **Transactions of the American Mathematical Society** 358 (2006)

Half-gropes, Simple Whitney towers and the Arf invariant of a knot, **Pacific Journal of Mathematics** Vol 222, No 1, Nov (2005)

Whitney towers and the Kontsevich integral, (with P. Teichner) **Geometry and Topology monograph series** Vol 7 (2004)

Algebraic linking numbers of knots in 3-manifolds, **Algebraic and Geometric Topology** Vol. 3 (2003)

Selected Presentations:

Topology in dimension 4.5 conference, Banff International Research Station (November 2022),

Topics in 4-dimensional Topology seminar, Max Planck-Institute for Mathematics, Germany (Winter 2022-23),

Winter Braids X conference, three invited lectures, Pisa Italy (February 2020),

Math Plus Music Quadrivium at the National Museum of Mathematics, NYC (April 2019),

Mathematics/Jazz presentation/performance (University of Georgia, Athens (March 2019),

Conference on 4-manifolds and knot concordance, Max Planck-Institute for Mathematics, Germany (October 2016),

Workshop at Oberwolfach Mathematics Institute, Germany (May 2014),

Semester on Topology of 4-manifolds, Max-Planck-Institute for Mathematics, Bonn (May 2013),

Low-dimensional topology and High-dimensional Categories, Conference in honor of Michael Freedman, UC Berkeley (June 2011),

Special session on Algebraic and Geometric Topology, AMS sectional meeting, Cornell University (September 2011),

Low-dimensional Topology seminar series on Whitney towers, Max-Planck-Institute for Mathematics, Bonn (November 2010),

Special session on knot theory and related topics, Joint AMS KMS meeting, Seoul (December 2009),

Special session on geometric topology, AMS sectional meeting, Wesleyan College (October 2008),

4-dimensional Manifolds Workshop at Oberwolfach Mathematics Institute, Germany (August 2006),

Julius Shaneson's Ides of March Topology Festival: Submanifolds, Singular Varieties and Stratified Spaces, Courant Institute (2005),

BANFF International Research Station conference on Knots and their manifold stories (May 2003),

Uni-Muenster, Junge Topologen und Neue Topologie conference (2001).

AMS meetings (special session talks): Lyon, special session on Low-dimensional Topology; University of Nevada, Las Vegas, special session on the Topology of links (2001).

Topology seminars: UPenn, CUNY Grad Center, Max-Planck-Institut-fur-Mathematik, University of Marseille, Uni Muenchen, Courant Institute, UC San Diego, University of Indiana, Stanford University, UC Berkeley, Barnard College/ Columbia University.

Teaching Experiences:

Instructor at Lehman College CUNY:
Topology (MAT 433/741)
REU Supervisor (Topology)
Analysis (MAT 320)
Foundations of Mathematics (MAT 670), Secondary mathematics from an advanced standpoint (MAT 601)
Calculus I, II, and III, (MAT 175, MAT 176, MAT 226), and Business Calculus (MAT 174),
Computer Labs for Calculus I and II (MAT 155, MAT 156),
Linear Algebra (MAT 313), and Abstract Algebra (MAT 314), Precalculus (MAT 172), and Business Precalculus (MAT 171),
Music and Mathematics (Honors seminar).

Instructor at UPenn:
Calculus II,
Calculus IV,
Linear Algebra,
Low-dimensional Topology (grad course).

Instructor at NYU:
Topology (grad course),
Advanced Calculus,
Business Calculus,
Calculus,
Elementary Statistics,
Logic.

Instructor at UC Berkeley:
Multi-variable Calculus (two summers).

Instructor at City College CUNY:
Precalculus (two summers).

Co-instructor at UC Berkeley:
Developed and co-taught an experimental Introduction to Topology Course.

Teaching Assistant at UC Berkeley:
All levels of Calculus, Discrete Math, Linear Algebra, Differential Equations (including workshop problem sessions).

Honors and Awards:

Simons Foundation Collaborative Grants for Mathematicians Award (2017-2023),
Simons Foundation Collaborative Grants for Mathematicians Award (2011-2016),
PSC-CUNY Research Awards (2006-2011),
National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship (2001),
Graduate Student Research Assistantships at UC Berkeley (spring 2000, spring 1998, fall 1998) and UC San Diego (summer 2000);

Chosen to receive Math Department Fellowship, UC Berkeley (spring 1998);
Graduate Student Instructorships, UC Berkeley, (fall 1994-spring 2001);
Summer Research Fellowship, UC Berkeley (summer 1995); Emil Post Award CCNY (1994);
Schwarz Scholarship CCNY (1992);
Belden Mathematical Prize CCNY (1991);
National Endowment for the Arts Jazz Performance Fellowship (1987).

Service:

Co-organizer of conference *Interactions between Topology and Quantum Field Theory*; SwissMAP Research Station (May 2023);
Served on multiple committees, Lehman College (2010- present);
Served on multiple committees, Lehman College (2010- present);
Mathematics Outreach: multiple presentations/performances on Mathematics and Music (2010-present);
Developed `Summer Math Workshop' for *Pathways to Student STEM Success* program, Lehman College (2017-2020);
Co-organizer of workshop in Low-dimensional Topology at Oberwolfach Mathematics Institute, Germany (May 2014);
Music/Math public outreach presentations, Max-Planck Institute for Mathematics, Bonn Germany (fall 2014) and Hausdorff Research Institute for Mathematics (fall 2010);
Course designer/instructor for Mathematics Teacher Transformation Institute at Lehman College;
Director of NSF-funded Computer Science and Mathematics Scholarship program at Lehman College (2011-2014);
Co-organizer of workshop in Low-dimensional Topology at

Mathematical Sciences Research Institute (2008); Departmental graduate and undergraduate student advisor at Lehman College;
Calculus committee at Lehman College (chair/coordinator); Departmental honors committee (Lehman College); Referee for various mathematics journals;
Co-organizer special session in Low-dimensional Topology at regional AMS meeting, Courant Institute NYU (2003); Served as mentor for incoming graduate students and helped organize graduate student topology seminar at UC Berkeley.

Additional personal info:

I came to discover Mathematics after a career playing jazz piano, which included recording and performing throughout North America, Europe and Japan. I've found that Mathematics demands the same blend of discipline and creativity as playing improvised music at a high level. I sometimes describe Mathematics as "music that only musicians can hear".

Rob Schneiderman C.V.

CHRISTINA SORMANI

Department of Mathematics
Lehman College and CUNY Graduate Center
sormanic@gmail.com

EDUCATION:

1996 **PhD Courant Institute of Mathematical Sciences, NYU**
Thesis: *Noncompact Manifolds with Lower Ricci Curvature Bounds and Minimal Volume Growth* Advisor: *Jeff Cheeger.*

1991 **BA College of Arts and Science, NYU**, *Magna cum Laude*, **ΦBK**
Majors: Mathematics and English Writing. **Minor:** Physics.

EXPERIENCE:

1999-present **Lehman College Full Professor (2010) Associate Professor (2005)**
Taught: *Analysis I-II, Axiomatic Geometry, Differential Geometry, Partial Differential Equations, Linear Algebra, Calculus I-III, Precalculus.*
Supervised Undergraduate Research Teams in Metric Geometry.

2003-present **Graduate Center, City University of New York, Doctoral Faculty**
Supervised Doctoral Students: *Jorge Basilio* (CUNY PhD 2017). *Michael Munn* (CUNY PhD 2008), *Sajjad Lakzian* (CUNY PhD 2013), Organized Reading Seminars. Supervised Postdoc: *Carlos Vega.*
Taught: *Differential Geometry*, *Special Topics in Metric Geometry.*

Fall of 2022 **Fields Institute, Scientific Committee**
Thematic Program on *Nonsmooth Riemannian and Lorentzian Geometry*

2018-2019 **Institute for Advanced Study, Visitor**
Special Year on *Variational Methods in Geometry*

2018-2019 **Simons Center for Geometry and Physics, Visitor**
Worked with Postdoc: *Demetre Kazaras*

2014-2015 **Stony Brook University, Visitor**
Supervised Doctoral Student: *Raquel Perales* (SB PhD 2015)

Fall of 2013 **Mathematical Sciences Research Institute, Visiting Professor**
Organized a Reading Seminar. Supervised Postdoc: *Zahra Sinaei.*

1997-1999 **Johns Hopkins University, Assistant Professor**
Postdoctoral Research under *Joel Spruck and William Minicozzi.*
Taught: *Analysis I-II*, *Graduate Riemannian Geometry I-II*, *Differential Geometry*, *Partial Differential Equations with Applications.*

1996-1997 **Harvard University, Lecturer,**
Postdoctoral Research under *Shing-Tung Yau.*
Taught: *Real Analysis*, *Multivariable Calculus.*

AWARDS:

2014-2015 **American Mathematical Society Fellow**
For Contributions to Geometry, including Ricci Curvature, and for Mentoring Activities, especially for Young Mathematicians from Underrepresented Groups.

2016-2020 **NSF Research Grant in Geometric Analysis: DMS-1612409 $167,988**
Geometric Compactness Theorems with Applications to General Relativity

2013-2016 **NSF Research Grant in Geometric Analysis: DMS-1309360 $116,000**
Applications of the Convergence of Manifolds to General Relativity

2010-2013 **NSF Research Grant in Geometric Analysis: DMS-1006059 $162,977**
Convergence of Riemannian Manifolds

2008-2010 **NSF Math Sciences Partnership Grant: MSP-0832247 $3,000,000**
Mathematics Teacher Transformation Institute (MTTI)
Lead PI with coPIs M. Wolfe, S. Gningue, S. Libfield, and S. Menendez

2001-2006 **NSF Research Grant: DMS-0102279 $85,714.00**
The Topology of Open Manifolds with Nonnegative Ricci Curvature

1999-2014 **PSC CUNY Internal Research Grants**

1999-2000 **NSF AWM Travel Grant for travel to Denmark**

1997-1998 **NSF ICM98 Travel Grant for travel to the Berlin ICM**

1991 - 1996 **National Science Foundation Graduate Fellowship**

SERVICE:

2000-present **LEHMAN COLLEGE SERVICE**

Junior Faculty Research and Scholarship Mentor (2022-present)
Organizer of the *Inspiring Talks in Mathematics* (2018-2021)
—- with talks aimed at math majors by mathematicians with recent doctorates
—- of Hispanic and African origins as well as an LGBTQ representative
Created the *Math Department Alumni Webpage* (2019-2020)
Member of *Natural and Social Sciences Faculty Research Advisory Board* (2018)
Elected Member of the *Educational Policy Committee* (2004-2020):
—- submitted suggestions for Strategic Plan and College Assessment.
—- redesigned the courses for the masters program in mathematics.
—- implemented uniform detailed syllabi for Precalculus-Calculus III.
Assessment Ambassador for Mathematics (2010-2016)
Lead PI for the Mathematics Teacher Transformation Institute (2008-2010)
—- designed courses and assessment for the institute
College Now Mathematics Advisor (2006-2012)
Computer Science and Mathematics Scholarship Program Advisor (2006-2008)
Lehman College Math Circle Advisor (2002-2006)
Calculus Committee Member (2000-2006, 2013-2016)

2000-present **CUNY GRADUATE CENTER SERVICE**

Member of the GC Mathematics Bylaws Committee (2022-present)
Member of the GC Mathematics Ranking Committee (2010) (2022-present)
Member of the Graduate Center *Research Committee* (2019-2021)
Served on Qualifying and Dissertation Defense Committees (2003-present)

2016-present **EDITORIAL BOARDS AND EDITING:**

American Mathematical Society Transactions, Editor (2023-2027)
Memoirs of the American Mathematical Society, Editor (2023-2027)
La Matematica: Associate Editor (2021-present)
—- handling research and survey articles in Geometric Analysis
SIGMA: *Special Volume in Honor of Gromov* (2019-2020)
—- proposed and coordinated this volume on Ricci and Scalar Curvature
American Mathematical Society Notices (2016-2018)
—- coordinated features on Nirenberg, Schoen, LIGO, and Morawetz
—- handled short articles on Open Problems

2015-2022 **CONFERENCES AND SEMINARS CO-ORGANIZED**

Low Regularity in Physics and Geometry Seminar (Summer-Fall 2022)
GNOSC: Not Only Scalar Curvature Seminar (Spring 2022)
VWRS: Virtual Workshop on Ricci and Scalar Curvature (August 2020)
Yale Filling Volumes, Geodesics, and Convergence Workshop (August 2019)
Cortona Summer School on the Geometry of Scalar Curvature (July 2019)
SCGP *Convergence and Low Regularity in General Relativity* (May 2019)
AMS Special Session at the Spring Eastern Sectional (April 2019)
CUNY Metric Geometry Workshop (January 14, 2019)
NYU Scalar Curvature Workshop (December 2018)
IAS *Emerging Topics Working Group* on Scalar Curvature (October 2018)
McGill University Geometric Analysis Workshop (July 23-27, 2018)
CUNY Geometric Analysis Day (July 13, 2018)
UNAM Convergence of Riemannian Manifolds Workshop (April 3-6, 2018)
Simons Center for Geometry and Physics, *Mass in GR Workshop* (March 2018)
CUNY Flat Convergence Workshop (June 2017)
CUNY Metric Geometry Workshop (Feb 2016)
Joint New York General Relativity Seminar 2013-2016
CUNY Convergence and Stratification Workshop (May 2015)
CUNY Curvature and Intrinsic Flat Convergence Workshop (March 2015)

2000-present **SERVICE TO THE PROFESSION**

AMS Committee on Meetings and Conferences (2016-2019)
Chair of subcommittee reviewing the scientific program of the JMM

Association for Women in Mathematics
Chair of the *Birman Research Prize* Selection Committee (2023)
Member of the *AWM Mentoring Grants* Selection Committee (2021)
Member of the *Birman Research Prize* Selection Committee (2019)
Distinguished Service Award (January 2015)
Member of the AWM Meetings Committee (2012-2015)
Co-organized the January JMM AWM panels on
"Building a Research Career in Mathematics" (2014)
"Retention of Women Faculty in Mathematics" (2013)
"Coauthoring and Collaboration in Mathematics" (2012)
"Supporting the Diverse Personal Lives of Mathematicians" (2004)
Wrote *"A Report on How to Increase the Number of Tenured Women in Mathematics"* for the AWM newsletter (2000).

AMS Riemannian Geometry Media Contact (2003-2012)
Interviewed regarding teacher preparation in NYS for Geometry Regents.
Interviewed by a variety of journalists writing articles on Perelman.

INVITED LECTURE SERIES:

2021 **Fourier Institute Summer School, France**
"Intrinsic Flat and Gromov-Hausdorff Convergence" (4 lectures)

2017 **Geometric Analysis Summer School, Fields Institute, Canada**
"Scalar Curvature and Intrinsic Flat Convergence" (4 lectures)

2016 **Geometric Analysis on Riemannian and Singular Spaces, Como, Italy**
"Gromov Hausdorff and Intrinsic Flat Convergence " (4 lectures)

2015 **USTC Summer School, Hefei, China**
"Ricci Curvature and Convergence" (6 lectures)

2015 **Winterschool on Geometry and Optimal Transport, Bonn, Germany**
"Intrinsic Flat Convergence and its Applications" (5 lectures)

2013 **ICMS Ricci Curvature Workshop, Edinburgh, Great Britain**
"Comparison Geometry with Ricci Bounds" (4 lectures)

2008 **Seminaire Borel: New Approaches to Curvature, Switzerland**
"Gromov Hausdorff Convergence and the Covering Spectrum" (4 lectures)

PLENARY ADDRESSES:

2019 **AMS Spring Eastern Sectional Meeting**
"Converging Sequences of Metric Spaces"

2019 **MAA Metro New York Annual Meeting**
"When do Sequences of Metric Spaces Converge?"

2018 **Explorations in Geometric Analysis in honor of Jozef Dodziuk**
"Limits of Manifolds with Positive Scalar Curvature"

2017 **Geometry Festival XXXII, Opening Address, Duke University**
"Open Questions on Convergence and Curvature"

2016 **Union College Mathematics Conference**
"Converging Spaces and their ADM Mass"

2016 **Reflections on Global Riemannian Geometry**
"Intrinsic Flat Convergence of Manifolds with Nonnegative Scalar Curvature"

2016 **Lehigh Geometry and Topology Conference**
"Recent Results on Intrinsic Flat Convergence"

2016 **Differential Geometry: Connections for Women, MSRI**
"Sliced Filling Volumes and Intrinsic Flat Convergence"

2015 **Texas Geometry and Topology Conference**
"Properties of Intrinsic Flat Convergence"

2015 **Southern California Geometric Analysis Seminar**
"Convergence of manifolds with nonnegative scalar curvature"

2014 **Geometric Analysis and Relativity, USTC, Hefei, China**
"Applications of the convergence of manifolds to problems in general relativity"

2013 **Workshop on Infinite-Dimensional Geometry, UC Berkeley**
"Intrinsic Flat Metric and Precompactness of Spaces of Manifolds"

2013 **MSRI Optimal Transportation Geometry and Dynamics**
"Convergence of Manifolds and Metric Measure Spaces"

2012 **Midwest Geometry Conference**
"The Positive Mass Theorem and the Intrinsic Flat Distance"

2011 **Pacific Northwest Geometry Seminar**
"The Positive Mass Theorem, the Penrose Inequality and the $\mathcal{F}$ Distance"

2010 **Notre Dame Interactions between Geometry and Analysis**
"Intrinsic Flat Convergence of Manifolds and Integral Current Spaces"

2009 **Geometry Festival XXIV, Stony Brook University**
"The Intrinsic Flat distance between Riemannian manifolds"

2009 **Workshop on Riemannian and Non-Riemannian Geometry, IUPUI**
"The Intrinsic Flat distance between oriented Riemannian manifolds"

2008 **UNAM Workshop Global Riemannian Geometry, Mexico**
"Open Questions on Open Manifolds with $Ricci \geq 0$"

2008 **Southeast Geometry Conference**
"Understanding the Topology of Manifolds with Nonnneg Ricci Curvature"

2007 **Texas Geometry and Topology Conference**
"Various Covering Spectra Spectra and Shift Spectra "

2007 **Bloomington Geometry Workshop**
"The Cut-off Covering Spectrum and Gromov-Hausdorff Convergence"

2006 **Midwest Geometry Conference**
"The Topology of Rioemannian Manifolds with Nonnegative Ricci Curvature"

2004 **Spectral Geometry Workshop, CRM, Montreal**
"The Covering Spectrum, the Length Spectrum and Convergence"

MORE INVITED TALKS:

2021-2022 Fields Workshop on Aspects of Ricci Curvature (Nov 14-18, 2022)
NEWGA Conference (Nov 5-6, 2022)
Conference on Differential Geometry, Lehigh (October 14-16, 2022)
SCGP Recent Advances on Scalar Curvature (June 27-30, 2022)
Florence Differential Geometry and Analysis Conference (June, 2022)
Barrett Memorial Lectures (June 9-12, 2022)
JoMaReC Seminar (May 5, 2022)
CMO BIRS Integral and Metric Geometry Workshop (May 2-3, 2022)
GNOSC Seminar [IHES VIDEO] (February 4, 2022)
Topology/Geometry Zoom Seminar, U Oregon (December 14, 2021)
BOWL Seminar, Brussels, Oxford, Warwick, London, (November, 2021)
Yale Geometric Analysis and Applications Seminar, (September 2021)

2011-2020 Optimal Transport and Geometric Analysis Warwick in Venice (April 2019)
Mathematical Relativity at University of Miami, (Dec 13-15, 2018)
IAS Mean Curvature and Regularity Workshop, (Nov 5-9, 2018)
Tufts Colloquium, (Sept 21, 2018)
Queen Mary College, Geometric Analysis Days, London, (Oct 30-31, 2018)
Oberwolfach: Mathematical General Relativity (August 2018)
Yale SUMRY Colloquium (July 11, 2018)
SCGP Mass in General Relativity, (March 2018)
Lehigh Geometry and Topology Conference (June 2018)
Stony Brook Math Day for undergraduates around New York (Spring 2018)
Joint AMS Meeting Session on General Relativity (January 2018)
Perspectiva Matematica at UNAM, a colloquium (November 2017)
MADGuyS (October 2017)
Princeton Geometric Analysis Seminar (September 2017)
Stony Brook: Geometry and Topology Seminar (September 2017)
MIT: Geometric Analysis Seminar (September 2017)
Stony Brook Geometry/Topology Seminar (February, 2017)
Geometric Analysis and General Relativity AMS Special Session (March, 2017)
BIRS Geometric Analysis and General Relativity Workshop (July 17-22, 2016)
Static Metrics and Bartnik's Conjecture in Tübingen (May 17-20, 2016)
University of Connecticut, Colloquium (April 14, 2016)
Rutgers University Geometry and Topology Seminar (Feb 9, 2016)
BIRS WIG Workshop in Banff, Canada (November 1-6, 2015)
East China Normal Geometric Analysis Seminar in Shanghai (July 13, 2015)
Workshop on Ricci Curvature, Northwestern University (May 28-31, 2015)
Southern California Geometric Analysis Seminar, UCSD (February 7-8, 2015)
Analysis/Geometry/PDE Seminar, Fordham University (October 22, 2014)
Geometric Analysis and Relativity at USTC, Hefei, China (7/6-10/2014)
Columbia University (4/25/2014)
Rutgers University (4/15/2014)
Infinite-Dimensional Geometry, UC Berkeley (December 7-8, 2013)
Stony Brook Geometry Seminar (Dec 3, 2013)
MSRI Evans Lecture (Nov 4, 2013)
Stanford Geometry Seminar (October 21, 2013)
Lehigh Geometry and Topology Conference (May 24-26, 2013)
Rice University, Seminar Speaker (April 18, 2013)
U Penn, Differential Geometry Seminar (March 21-22, 2013)
Urbana Champaign, Seminar Speaker (March 12, 2013)
UC San Diego, Seminar Speaker (January 8, 2013)
Oberwolfach: Mathematical Aspects of General Relativity (July 2012)
Lehigh Geometry and Topology Conference Contributed Talk (May 26, 2012)
Rutgers Camden EWIS Seminar (March 30, 2012)
MIT Geometric Analysis Seminar (February 15, 2012)
JMM MAA Invited Paper Session on Decoding Geometry (January 5, 2012)
University of Vienna, Gravitational Physics Seminar (October 13, 2011)
ETH Zurich Analysis Seminar (October 11, 2011)
Oberwolfach: Partial Differential Equations Workshop (August 11, 2011)
Pacific Northwest Geometry Seminar, University of Washington (May 2011)
Stony Brook Geometry/Topology Seminar (April 12, 2011)
MIT Geometric Analysis Seminar, (March 2011)
Harvard University Differential Geometry Seminar, (March 2011)
Dartmouth University Geometry and Topology Seminar, (February 2011)
MIT D. W. Weeks Lecture, (February 2011)

2006-2009 UC Santa Barbara, Differential Geometry Seminar (October 8, 2010)
Columbia University, Geometric Analysis Seminar (February 12, 2009)
Harvard University, Differential Geometry Seminar (February 17, 2009)
Dartmouth University, Colloquium (February 19, 2009)
AMS Meeting Special Session Urbana Champagne (March 2009)
NYU Poly, Colloquium (April 23, 2009)
Workshop on Riemannian and Non-Riemannian Geometry, IUPUI, Indianapolis, (August 2009)
University of Pennsylvania (November 12, 2009)
Rutgers University (December 1, 2009)
University of Arizona Math Colloquium and Seminar, (Jan 24-5, 2008)
UNAM Workshop in Global Riemannian Geometry, (May 12-18, 2008)
Brown University, Xtreme Geometry seminar (March 1, 2007)
Tufts University Colloquium, (March 30, 2007)
NYU Differential Geometry and Topology Seminar (April 6, 2007)
Urbana-Champaign, Differential Geometry Seminar (April 12, 2007)
Princeton University Geometric Analysis Seminar (Spring 2006)
Cornell University Analysis Seminar (Fall 2006)

PUBLISHED RESEARCH PAPERS:

[APS-23] **"Volume Above Distance Below"** with Brian Allen (Asst Prof at Lehigh) and Raquel Perales (Scientista in Oaxaca), *Journal of Differential Geometry.*

[GrSo-22] **"Lorentzian area and volume estimates for integral mean curvature bounds"** with Melanie Graf (postdoc Tuebingen),
Developments in Lorentzian Geometry: GeLoCor 2021, Springer (2021)

[BaSo-22] **"Sequences of three dim manifolds with positive scalar curvature"** with Jorge Basilio (recent PhD of CUNYGC), Differential Geometry and its Applications, Vol. 77, (2021)

[AllS-20] **"Relating Notions of Convergence in Geometric Analysis"** with Brian Allen (Asst Prof at Hartford), *Nonlinear Analysis* Vol 200 (2020).

[BrKhS] **"Stability of the Spacetime Positive Mass Theorem in Spherical Symmetry"** with Bryden, (Postdoc at Tübingen) and Khuri (prof at SB) to appear in *Journal of Geometric Analysis*

[BaKaS] **"An Intrinsic Flat Limit of Riemannian Manifolds that has no Geodesics"** with Basilio (Recent CUNY PhD) and Kazaras (Postdoc at SB) *Geometriae Dedicata*, Vol 204 (2020) 265-284.

[AllS-19] **"Contrasting Various Notions of Convergence in Geometric Analysis"** with Brian Allen (Postdoc at USMA)
Pacific Journal of Mathematics Vol 303 (2019), No.1, 1-46.

[StvS] **"Geometrostatic Manifolds of Small ADM Mass"**
with Iva Stavrov (Professor at Louis and Clark College)
Comm on Pure and Applied Mathematics Vol 72, Issue 6 June 2019, 1243-1287.

[BaDoS] **"Sewing Riemannian Manifolds with Positive Scalar Curvature"**
written with Jorge Basilio (Doctoral Student) and Jozef Dodziuk (Co-Advisor)
Journal of Geometric Analysis Dec 2018, Volume 28, Issue 4, 3553-3602.

[S-ArzAsc] **"Intrinsic Flat Arzela-Ascoli Theorems"** (no coauthors)
Communications in Analysis and Geometry, Vol. 27, No 1, (2019) 44pp.

[SakSor] **"Almost Rigidity of the Positive Mass Theorem for Asymptotically Hyperbolic Manifolds with Spherical Symmetry"**
written with Anna Sakovich (Postdoc at MSRI, Senior Lecturer at Uppsala)
Editor's Choice in *General Relativity and Gravitation*, Sept (2017) 49:125.

[S-Prop] **"Properties of the Intrinsic Flat Distance"** with
Portegies (Postdoc at Max Plank), Special Volume in Honor of Yuri Burago,
Algebra i Analiz Issue 3, Volume 29, (2017) 70-143.

[HLS] **"Intrinsic Flat Stability of the Positive Mass Theorem for Graphical Hypersurfaces in Euclidean Space"**
written with L-H Huang (Prof at U Conn) and D. A. Lee (Prof at CUNY),
Journal für die Riene und Angewandte Mathematik, Vol. 727 (2017) 269-299.

[LinS] **"Bartnik's Mass and Hamilton's Modified Ricci Flow"**
written with Chen-Yun Lin (Postdoc at U Toronto and Duke),
Annales Henri Poincaré, Vol. 17, Issue 10, October (2016) 2783-2800.

[SVega] **"Null Distance on a Spacetime"**
written with Carlos Vega (funded Postdoc at CUNY),
Classical and Quantum Gravity, Vol. 33 (2016) no 8 1-29.

[SiS] **"Intrinsic Flat Convergence of Covering Spaces"**
written with Zahra Sinaei (Postdoc at MSRI and CIMS)
Geometriae Dedicata, Vol 184 (2016) 83-114.

[SLeFl-S] **"Nonlinear Stability of Spaces with Low Regularity"**
written with Philippe LeFloch (Director at CNRS)
Journal of Functional Analysis, 268 no. 7 (2015) 2005-2065.

[SWei-V] **"Various Covering Spectra for Complete Metric Spaces"**
solicited article written with Guofang Wei (Professor at UCSB)
Asian Journal of Mathematics, Vol. 19, No 1, January (2015) 171-202.

[PS-Pacific] **"Sequences of Open Riemannian manifolds with Boundary"**
written with Raquel Perales (Funded Doctoral Student at Stony Brook)
Pacific Journal of Mathematics, 270, no. 2, (2014) 423-471.

[LS-Crelle] **"Stability of the Positive Mass Theorem for Rotationally Symmetric Riemannian Manifolds"**
written with Dan Lee (a junior colleague at CUNYGC),
Crelle's Journal fur die Riene und Ang Mathematik, Vol 686 (2014) 187-220.

[LkS-CAG] **"Smooth Convergence Away from Singular Sets"**
written with Sajjad Lakzian (a funded Doctoral Student at CUNYGC)
Communications in Analysis and Geometry, Vol 21, No 1, (2013) 39-104.

[S-Tetra] **"The Tetrahedral Property and a new Gromov-Hausdorff Compactness Theorem"**
Comptes Rendus Mathematique, Vol 351, Issues 3-4, (2013) 119-122.

[LS-Poincare] **"Near-equality of the Penrose Inequality for Rotationally Symmetric Riemannian Manifolds"**
written with Dan Lee (a junior colleague at CUNYGC)
Annales Henri Poincaré, Vol 13, Issue 7, (2012) 1537-1556.

[SW-JDG] **"The Intrinsic Flat Distance between Riemannian Manifolds and Integral Current Spaces"**
written with Stefan Wenger (Postdoc at CIMS, NYU)
Journal of Differential Geometry, Vol. 87 (2011) 117-199.

[SW-CVPDE] **"Weak Convergence of Currents and Cancellation"**
written with Stefan Wenger (Postdoc at CIMS, NYU)
Calculus of Variations and P.D.E., Appendix by Raanan Schul and Stefan Wenger, Vol. 38, No 1-2, May, (2010) 183-206.

[SWei-T10] **"The Cut-off Covering Spectrum"**
written with Guofang Wei (Professor at UCSB)
Transactions of the American Mathematical Society 362, (2010) 2339-2391.

[ShS-AIM] **"Conjugate Points in Length Spaces"**
written with Krishnan Shankar (Professor at the University of Oklahoma)
Advances in Mathematics, 220, (2009) 791-830.

[S-AIM] **"Convergence and the Length Spectrum".**
Advances in Mathematics, Vol 213, Issue 1, (August 2007) 405-439.

[SWei-JDG] **"The Covering Spectrum of a Compact Length Space".**
written with Guofang Wei (Professor at UCSB)
Journal of Differential Geometry 67 (2004) 35-77.

[SWei-T04] **"Universal Covers for Hausdorff Limits of Noncompact Spaces".**
written with Guofang Wei (Professor at UCSB) 34 pages
Transactions of the AMS 356, no. 3, (2004) pp. 1233-1270.

[S-GAFA-04] **"Friedmann Cosmology and Almost Isotropy".**
Geometric and Functional Analysis, Vol. 14 (2004) 853-912.

[SWei-T01] **"Hausdorff Convergence and Universal Covers".**
written with Guofang Wei (Professor at UCSB)
Transactions of the American Mathematical Society 353 (2001) 3585-3602.

[SShen-AJM] **"The Codimension One Homology of a Complete Manifold with Nonnegative Ricci Curvature"**
written with Zhongmin Shen (Professor at IUPUI)
American Journal of Mathematics 123 (2001) 515-524.

[S-Ind] **"On Loops Representing Elements of the Fundamental Group of a Complete Manifold with Nonnegative Ricci Curvature"**
Indiana Univ. Math. Journal 50, no. 4, (2001) 1867–1883.

[S-JDG-00] **"Nonnegative Ricci Curvature, Small Linear Diameter Growth and Finite Generation of Fundamental Groups".**
Journal of Differential Geometry 54 (2000) 547-559.

[S-PJMS] **"Harmonic Functions on Manifolds with Nonnegative Ricci Curvature and Linear Volume Growth".**
Pacific Journal of Mathematics, Vol 192, No 1, (2000) 183-189.

[S-CAG] **"The Almost Rigidity of Manifolds with Lower Bounds on Ricci Curvature and Minimal Volume Growth".**
Communications in Analysis and Geometry Vol 8 No. 1 (2000) 159-212.

[S-JDG-98] **"Busemann Functions on Manifolds with Lower Bounds on Ricci Curvature and Minimal Volume Growth".**
The Journal of Differential Geometry, Vol 48, (1998) 557-585.

BOOKS EDITED:

[Szpiro] **Poincaré's Prize: The Hundred-Year Quest to Solve One of Math's Greatest Puzzles** by George G. Szpiro
PLUME, Penguin Group, ISBN 978-0-525-95024-0 (2008)
Mathematical Editing by Christina Sormani.

CONFERENCE REPORTS:

[GS-IAS-18] **IAS Emerging Topics Report: (2018)**
Scalar Curvature and Convergence
Written up jointly with Misha Gromov

[S-OBER-18] **Oberwolfach Report: (2018)**
Spacetime Intrinsic Flat Convergence
Mathematical General Relativity

[S-OBER-12] **Oberwolfach Report 37 (2012)**
Mathematical Aspects of General Relativity Workshop,
Organized by Dafermos, Isenberg and Ringstrom

[S-OBER-11] **Oberwolfach Report 38 (2011)**
Partial Differential Equations Workshop
Organized by Ambrosio, Chang, Schatzle and Weiss

SURVEY ARTICLES:

[S-Conj] **"Conjectures on Convergence and Scalar Curvature"** Chapter for *Perspectives in Scalar Curvature* edited by Gromov and Lawson, World Scientific (2022)

[S-Comp] **"Compactness Theorems for Sequences of Riemannian Manifolds"** *AMS Sampler*, AMS Notices, April 2019.

[S-Scal] **"Scalar Curvature and Intrinsic Flat Convergence"** a chapter in *Measure Theory in Non-Smooth Spaces*, De Gruyter Press, edited by Nicola Gigli, De Gruyter Press, (2017) pp 288-338.

[S-PiM] **"How Riemannian Manifolds Converge: a Survey"** a chapter in Metric and Differential Geometry: *The Jeff Cheeger Anniversary Volume* edited by X. Rong and X. Dai, Progress in Mathematics, Vol 297, (2012) 27pp.

[SShen-CMA] **"The Topology of Open Manifolds of Nonnegative Ricci Curvature"** written with Zhongmin Shen, *Communications in Mathematical Analysis*, Conf. 01. (2008) pp 11-19.

WEBSITES:

[homepage] **https://sites.google.com/site/professorsormani/** a virtual vita with links to all my papers, courses, talks, students, and service, including links to videos of selected addresses.

[bibliography] **https://sites.google.com/site/intrinsicflatconvergence/** a bibliography of all articles related to intrinsic flat convergence.

PREPRINTS:

[SS-Null] **"The Null Distance Encodes Causality"** with Anna Sakovich (24 pages) posted preprint arXiv:2208.01975

[LinSor] **"From Varadhan's Limit to Eigenmaps: A Guide to the Geometric Analysis behind Manifold Learning"** with Chen-Yun Lin (54 pages) posted preprint arXiv:2210.10405

[LinSor] **"From Varadhan's Limit to Eigenmaps: A Guide to the Geometric Analysis behind Manifold Learning"** with Chen-Yun Lin (54 pages) posted preprint arXiv:2210.10405

[SS-SIF] **"Cosmological Spacetime Intrinsic Flat Convergence"** with Anna Sakovich (results announced) (finalizing before posting)

[STW-Ex] **"An Extreme Limit with Nonnegative Scalar Curvature"** with Wenchuan Tian and Changliang Wang (in progress)

UNDERGRAD AND MASTERS STUDENT RESEARCH TEAMS:

2020-2022 **Online Research in Manifold Learning** *with Prof Chen-Yun Lin*
Esteban Alcantara (Lehman), Maziar Farahzad (Stony Brook), Julinda Pillati Mujo (Lehman), Dahkota Debold (CCNY), Abdelali Hourmati (Lehigh), Alex Cernei (CCNY), Karla Hernandez (Lehman), Tabitha Ramirez (CCNY).

2019-2020 **Smocked Metric Spaces Team** *with Dr. Demetre Kazaras*
David Afrifa (Lehman), Victoria Antonetti (Lehman), Moshe Dinowitz (Stony Brook), Hindy Drillick (Stony Brook), Maziar Farahzad (Stony Brook), Shanell George (Lehman), Aleah Lydeatte Hepburn (Lehman), Leslie Trang Huynh (Lehman), Emilio Minichiello (Queens), Julinda Pillati Mujo (Lehman), Srivishnupreeth Rendla (Stony Brook), and Ajmain Yamin (Stony Brook).

2016-2017 **LSAMP Metric Geometry Team**
Amanda Rodriguez (Lehman), Fifonsi Lantonkpode (Lehman), Benjamin Arthur (Lehman), Shanell George (Lehman), Vanessa Ortiz (Lehman), Ulysses Hernandez (Lehman).

DOCTORAL STUDENTS:

2017 **Jorge Basilio (CUNYGC PhD)**
Manifold Convergence: Sewing Sequences of Riemannian Manifolds
was supervised jointly with Prof. Jozef Dodziuk
has written 3 papers with 27 citations
currently at Pasadena City College in California

2015 **Raquel del Carmen Perales Aguilar (SB PhD)**
Convergence of Manifolds and Metric Spaces with Boundary
was supervised jointly with Prof. Blaine Lawson
served as a postdoc at MSRI in Berkeley
has written 16 papers with 116 citations
currently Científica por México at UNAM in Oaxaca

2013 **Sajjad Lakzian (CUNYGC PhD)**
Smooth Convergence Away From Singular Sets and Intrinsic Flat Continuity
served as a postdoc at Universitat Bonn
has written 19 papers with 166 citations
currently tenure track at Isfahan University in Iran

2011 **Pedro Antonio Ricardo Martin Solórzano Mancera (SB PhD)**
Group Norms and their Degeneration in the Study of Parallelism
was supervised jointly with Prof. Blaine Lawson
has written 11 papers with 15 citations
currently Catedrático CONACYT at UNAM in Oaxaca

2008 **Michael Munn (CUNYGC PhD)**
Volume Growth and Topology of Manifolds with Nonnegative Ricci Curvature
served as a postdoc at Warwick University
has written 14 papers and a book with 166 citations
currently employed at Google New York

MAHMOUD ZEINALIAN

17 Oct 2019

Dept of Math, Graduate Center CUNY, 365 Fifth Ave, New York, NY 10016
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Education

CUNY Gradaute Center	Mathematics	PhD	Oct 01
CUNY, Graduate Center	Mathematics	MPh	May 98
Sharif University of Technology	Mathematics	BSc	July 94

Appointments

CUNY Graduate Center	Professor	18-
CUNY Lehman College	Professor	18-
CUNY Graduate Center	Professor (adjunct)	14-18
Long Island University	Professor	12-18
Long Island University	Associate Professor	07-12
Long Island University	Assistant Professor	02-07
University of Oklahoma	Visiting Assistant Professor	01-02

Publications

- **Chern character for infinity vector bundles** (w/ Cheyne Glass, Micah Miller, and Thomas Tradler) arXiv:2211.02549 (2022)
- **A homological approach to the Gaussian Unitary Ensemble** (w/ Alastair Hamilton and Owen Gwilliam) arXiv:2206.04256 (2022)
- **Categorical models for path spaces** (w/ Emilio Minichiello and Manuel Rivera), arXiv:2201.03046 (2022)
- **Large N phenomena and quantization of the Loday-Quillen-Tsygan theorem** (w/ Alastair Hamilton and Owen Gwilliam) arXiv:2108.12109 (2021)
- **The simplicial coalgebra of chains determines homotopy types rationally and one prime at a time** (w/ Manuel Rivera and Felix Wierstra), Transactions of the American Mathematical Society (2022)
- **The Hodge Chern character of holomorphic vector bundles as a map of simplicial presheaves** (w/ Cheyne Glass, Micah Miller, and Thomas Tradler), Algebraic & Geometric Topology (2022)
- **Singular chains and the fundamental group** (w/ Manuel Rivera), Fundamenta Mathematicae 253 (2021)
- **Rational homotopy equivalences and singular chains** (w/ Manuel Rivera and Felix Wierstra), Algebraic & Geometric Topology, 21 (2021) 1535-1552
- **The colimit of an ∞-local system as a twisted tensor product** (w/ Manuel Rivera), Higher Structures 4(1):33-56, (2020)
- **The functor of singular chains detects weak homotopy equivalences** (w/ Manuel Rivera and Felix Wierstra), Proc. Amer. Math. Soc. 147, (2019) 4987-4998
- **Center of mass and Kähler structures** (w/ Scott Wilson), J. Geom. 110 (2019), no. 2, 110:33

- **Cubical rigidification, the cobar construction, and the based loop space** (w/ Manuel Rivera), Algebraic & Geometric Topology 18 (2018) 3789-3820

- **One more proof of the index formula for block Toeplitz operators** (w/ Thomas Tradler and Scott Wilson), Journal of Operator Theory, 76:1 (2016) 171-174

- **Differential K-theory as equivalence classes of maps to Grassmannians and unitary groups** (w/ Thomas Tradler and Scott Wilson), New York J. Math. 22 (2016) 527-581

- **Higher Hochschild cohomology, brane topology and centralizers of E_n-algebra maps** (w/ Gregory Ginot and Thomas Tradler), arXiv:1205.7056

- **Loop differential K-theory** (w/ Thomas Tradler and Scott Wilson), Annales Mathématiques Blaise Pascal, Vol 22, no 1 (2015) 121-163

- **Higher Hochschild homology, topological chiral homology and factorization algebras** (w/ Gregory Ginot and Thomas Tradler), Comm. Math. Phys. 326 (2014) 635-686

- **An elementary differential extension of odd K-theory** (w/ Thomas Tradler and Scott Wilson), J. K-Theory 12 (2013) 331-361

- **Equivariant holonomy for bundles and abelian gerbes** (w/ Thomas Tradler and Scott Wilson), Comm. Math. Phys. 315 (2012) 39-108

- **A Chen model for mapping spaces and the surface product** (w/ Gregory Ginot and Thomas Tradler), Ann. Scient. Éc. Norm. Sup. 4^e série, t. 43 (2010) 811-881

- **Algebraic string bracket as a Poisson bracket** (w/ Hossein Abbaspour and Thomas Tradler), J Noncommutative Geom, Volume 4, Issue 3 (2010) 331-347

- **Closed string TCFT for Hermitian Calabi-Yau elliptic spaces** (w/ Kevin Costello and Thomas Tradler), arXiv:0807.3052

- **Algebraic string operations** (w/ Thomas Tradler), K-Theory, 38, no. 1 (2007) 59-82

- **Infinity structure of Poincaré duality spaces** (w/ Thomas Tradler and an appendix by Dennis Sullivan), Algebraic and Geometric Topology 7 (2007) 233-260

- **String bracket and flat connections** (w/ Hossein Abbaspour), Algebraic and Geometric Topology 7 (2007) 197-231

- **Maximal convergence groups and rank one symmetric spaces** (w/ Ara Basmajian), J. Aust. Math. Soc. 83 (2007) no. 1, 1-9

- **On the cyclic Deligne conjecture** (w/ Thomas Tradler), Journal of Pure and Applied Algebra Volume 204, no. 2, (2006) 280-299

- **Möbius transformations of the circle form a maximal convergence group** (w/ Ara Basmajian), The geometry of Riemann surfaces and abelian varieties, Contemp. Math., 397, Amer. Math. Soc., Providence, RI, (2006) 1-6

- **When ellipses look like circles: the measurable Riemann mapping theorem** (w/ Saeed Zakeri), Nashr-e Riazi, 8, (1996) 5-14 (in Persian)

Grants

17 Oct 2019

- **National Science Foundation, CoPrincipal Investigator, Conference Grant** 22

  Four Decades of the Einstein Chair Seminar

- **City University of New York PSC Grant** 19-20

  Symplectic Structure of the Moduli Stack of Flat Chen Connections

- **National Science Foundation, Principal Investigator** 13-16

  Geometric Cocycles, Differential K-theory, and Non-Abelian Gerbes, DMS-1309099

- **Simons Foundation, Collaboration Grants for Mathematicians, Principal Investigator**

  Differential K-Theory, Gerbes, and Higher Hochschild Complexes, 283272 13-14

- **National Science Foundation, CoPrincipal Investigator** 14

  The CUNY Workshop in Differential Cohomologies, DMS-1439395

- **National Science Foundation, Senior Participant** 08-12

  FRG: Collaborative Research: How the Algebraic Topology of Closed Manifold Relates to Strings and 2D Quantum Field Theory, DMS-0757245

Scholarships

- **Research Scholarship**, Max Planck Institut für Mathematik, Bonn, Germany Jun-Aug, 20
- **Research Scholarship**, Max Planck Institut für Mathematik, Bonn, Germany Jun-Aug, 19
- **Research Scholarship**, Max Planck Institut für Mathematik, Bonn, Germany May-Aug, 18
- **Research Scholarship**, Max Planck Institut für Mathematik, Bonn, Germany May-Jul, 17
- **Research Scholarship**, Max Planck Institut für Mathematik, Bonn, Germany Jan-Aug, 16
- **Research Scholarship**, Max Planck Institut für Mathematik, Bonn, Germany Jul, 13
- **Research Scholarship**, Max Planck Institut für Mathematik, Bonn, Germany Jul, 12
- **Research Scholarship**, Max Planck Institut für Mathematik, Bonn, Germany Jul, 11
- **Research Scholarship**, Max Planck Institut für Mathematik, Bonn, Germany Jun-Aug, 10
- **Research Scholarship**, Max-Planck-Institut für Mathematik, Bonn, Germany Sept 08-Aug 09
- **Research Scholarship**, Max-Planck-Institut für Mathematik, Bonn, Germany May-Aug, 07

Other Research Activities

- **Visiting Researcher**, University of Paris XIII Jun 30-Jul 8, 18
- **Visiting Researcher**, IHES, Bures-sur-Yvette, France Jan 1-Jan 15, 17
- **Visiting Position**, Ada Peluso Endowed Chair in Math, Hunter College Sept 1-Dec 31, 15
- **Visiting Researcher**, Hausdorff Center: Hom Th, Mflds, and Field Th. May 4-Aug 21, 15

· **Visiting Researcher**, Simons Center for Geom and Phys Jun 30, 15

· **Visiting Researcher**, IHES, Bures-sur-Yvette, France Jun 28-Jul 11, 10

· **Visiting Researcher**, Université de Nantes, Nantes, France Jul 7-21, 09

· **Visiting Researcher**, IHES, Bures-sur-Yvette, France Apr 10-Jun 10, 09

· **Visiting Researcher**, Graduate Center, CUNY, New York, NY Sep 1, 02- Aug 31, 03

Doctoral Students

· Yashasvi Aulak, CUNY Graduate Center current

· Emilio Minichiello, CUNY Graduate Center current

· Jeffrey Kroll, CUNY Graduate Center PhD 21
Thesis: Representing the Derivative of Trace of Holonomy

· Byung Do Park, CUNY Graduate Center PhD 16
Thesis: A geometric model of twisted differential K-theory

· Micah Miller, CUNY Graduate Center PhD 11
Thesis: Algebraic models for the free loop space and differential forms of a manifold

Outreach activities

· Faculty sponsor for CUNY students "Lightning Talks" 19-

· Faculty sponsor for CUNY students "Math Briefs" 18-

· Professional development lectures to Math for America (M*f*A) teachers 13-

· Member of the Screening and Selection Committee for the M*f*A Fellowship Program 12-16

· Mathematics lectures (6 per year) to high school students from Collegiate, Brearley, Chapin, and Trinity schools in New York City 03-14

Talks in the past 5 years

· **Cyclic cohomology and Gaussian Unitary Ensembles**, Western University 11/29/22

· **Loday-Quillen-Tsygan Map and the Gaussian Unitary Ensembles**, Puerto Rico 6/2/22

· **Random matrices and cyclic cohomology**, Penn State University 4/12/22

· **The Harer-Zagier formula and the string topology operations**, CIRM Luminy 10/7/20

· **Spaces, Categories, and the Cobar Construction**, Max Planck Institute 8/15/19

· **The Hodge and de Rham Chern char of hol connections**, Max Planck Institute 8/12/19

· **The Hodge and de Rham Chern char of hol connections**, Mexico City 4/23/19

· **The Hodge and de Rham Chern char of hol connections**, U Mass Amherts 4/4/19

· **The rigidification functor and the fundamental group**, Cat. Th. Octoberfest 10/27/18

· **From 2D hyperbolic geom to the Loday-Quillen-Tsygan thm**, U Strasbourg 9/14/18

· **From 2D hyperbolic geom to the LQT theorem**, Max Planck Institute 6/12/18

· **On algebraic operations on loops and the stack of local systems**, U Strasbourg 6/9/17

· **On some symplectic aspects of moduli stack of Chen connections**, Princeton 4/20/17

· **Adams' cobar construction for non-simply connected spaces**, U Penn 4/9/17

· **On the moduli stack of Chen connections and the Wilson loops**, Cinvestav 3/16/17

· **On algebraic operations on loops and the stack of local systems**, Penn State U 11/15/16

· **Poisson geometry of the moduli stack of superconnections**, Max Planck Institute 7/20/16

· **Holonomy obs and Poisson geom of mod stack of superconn**, U Strasbourg 6/6/16

· **Poisson geom of moduli stack of superconn**, U Pierre et Marie Curie 20/1/16

· **Poisson geom of moduli stack of twists**, Schrödinger Institute 12/15/15

· **Flat superconn and Poisson geom of mod of infty loc sys**, U Penn 9/30/15

· **Flat superconn and Poisson geom of mod of infty loc sys** Millersville U 9/11/15

· **Fricke-Klein coordinates and local systems**, Hausdorff Center for Math 8/11/15

· **Derived symplectic geometry**, Max Planck Institute 7/27/15

· **Loop differential K-theory**, U Strasbourg 6/22/15

· **Toward a definition of loop differential K-theory**, U Pittsburgh 3/29/15

· **Loop differential K-theory**, AMS Special Session, Washington DC 3/07/15

Teaching Experience

· CUNY Lehman College, NY 18-

· Long Island University C.W. Post, Long Island, NY 02-18

· Oklahoma University, Norman, OK 01-02

· Borough of Manhattan Community College, New York, NY 97-01

· Queens College, Queens, NY 01

· Bronx Community College, Bronx, NY 01

· Brooklyn College, Brooklyn, NY 98

Curriculum Vitae
Brian Wynne

Academic Degrees

Ph.D., Mathematics, Wesleyan University, 2005. Thesis Advisor: Philip Scowcroft

B.A., Mathematics and Computer Science (double major), Colgate University, 1998

Employment

Assistant Professor, Lehman College, CUNY, 2022–present

Doctoral Lecturer, Lehman College, CUNY, 2014–2022

Van Vleck Visiting Researcher, Wesleyan University, 2012–2013 (Sabbatical year)

Assistant Professor, Bard College at Simon's Rock, 2008–2014

Visiting Professor, Colgate University, 2006–2008

Postdoctoral Fellow, Colgate University, 2005–2006

Graduate Teaching Assistant, Wesleyan University, 1999–2005

Graduate Teaching Assistant, University of Oregon, 1998–1999

Research Interests

Model theory and its applications; lattice-ordered groups; Ramsey theory

Publications

1. P. Bhattacharjee, A. Hager, W. McGovern, B. Wynne, *Martinez ℓ-groups* (in preparation)
2. A. Hager, B. Wynne, *Atoms in the lattice of hull operators in subcategories of Archimedean ℓ-groups with weak unit* (in preparation)
3. A. Hager, B. Wynne, *α-projectable and laterally α-complete Archimedean lattice-ordered groups with weak unit via topology* (submitted)
4. A. Hager, B. Wynne, *The category of compactifications and its coreflections*. Commentationes Mathematicae Universitatis Carolinae (accepted)
5. A. Hager, B. Wynne, *Minimum proper extensions in some lattices of subalgebras*. Algebra Universalis **83**, no. 3 (2022)
6. A. Hager, B. Wynne, *On minimum proper essential extensions in a category*. Quaestiones Mathematicae (2022) DOI: 10.2989/16073606.2022.2033870
7. B. Wynne, *Construction of existentially closed Abelian lattice-ordered groups using Fraïssé limits*. Algebra Universalis **82**, no. 1 (2021)
8. A. Hager, B. Wynne, *Atoms in the lattice of covering operators in compact Hausdorff spaces*. Topology and its Applications **289**, 107402 (2021)

9. B. Wynne, *Construction of existentially closed Abelian lattice-ordered groups using upper extensions*. Algebra Universalis **79** (2018), 79:51
10. D. Saracino, B. Wynne, *The 2-color Rado Number of $x + y + kz = 3w$*. Ars Combinatoria **90** (2009), 119–128
11. B. Wynne, *The elementary-equivalence classes of clopen algebras of P-spaces*. Fundamenta Mathematicae **201** (2008), 149–161
12. B. Wynne, *Decidable theories of non-projectable ℓ-groups of continuous functions*. Annals of Pure and Applied Logic **146** (2007), 21–39

Talks

1. *Minimum proper essential extensions in a category*, AMS Fall Central Sectional Meeting, Special Session on Ordered Structures, University of Texas, El Paso, September 17, 2022
2. *Minimum proper extensions in lattices of subalgebras*, BLAST Conference (on Boolean Algebras, Lattices, Universal Algebra, and Set Theory), Chapman University, August 11, 2022
3. *Atoms in the lattices of hull operators on* **W** *and in related lattices*, BLAST Conference (on Boolean Algebras, Lattices, Universal Algebra, and Set Theory), New Mexico State University, June 10, 2021
4. *More on e.c. ℓ-groups via Fraïssé's construction*, OAL19: Conference on Ordered Algebraic Structures, Louisiana State University, May 6 2019
5. *An e.c. ℓ-group via Fraïssé's construction*, OAL18: Conference on Ordered Algebraic Structures, Florida Atlantic University, May 12, 2018
6. *Interpreting second-order arithmetic in $C(X)$*, CUNY Model Theory Seminar, CUNY Graduate Center, November 17, 2017
7. *More on upper extensions of e.c. ℓ-groups*, OAL17: Conference on Ordered Algebraic Structures, Louisa State University, May 16, 2017
8. *Upper extensions of existentially closed Abelian lattice-ordered groups*, CUNY Model Theory Seminar, CUNY Graduate Center, April 28, 2017
9. *Upper extensions of existentially closed Abelian lattice-ordered groups*, Connecticut Logic Seminar, Wesleyan University, April 10, 2017
10. *Upper products of e.c. Abelian ℓ-groups, redux*, OAL14: Conference on Ordered Algebraic Structures, Louisiana State University, May 1, 2014
11. *Upper products of existentially closed Abelian ℓ-groups*, Harvard Logic Seminar, November 26th, 2013
12. *Lex-products of existentially closed Abelian ℓ-groups*, OAL13: Conference on Ordered Algebraic Structures, Penn State Erie, The Behrend College, June 26, 2013
13. *The two-color Rado number of $x+y+kz = 3w$*, Algebra Seminar, Wesleyan University, November 30, 2012
14. *More decidable theories of non-projectable ℓ-groups*, Special Session on Model Theory and Its Applications, AMS Eastern Sectional Meeting, Wesleyan University, October 12, 2008

15. *Results on Boolean algebras with applications to the model theory of ℓ-groups*, BLAST Conference, University of Denver, August 7, 2008
16. *Two decidable theories of non-projectable Abelian lattice-ordered groups*, CUNY Logic Workshop, CUNY Graduate Center, February 9, 2007
17. *Elementarily equivalent ℓ-groups of continuous functions on essential P-spaces*, AMS Special Session on Topological Spaces Associated with $C(X)$, Joint Mathematics Meetings, San Antonio, January 13, 2006

Teaching Experience

1. Lehman College
    - MAT 123: A Problem-Solving Approach to Mathematics
    - MAT 155: Calculus I Lab
    - MAT 175: Calculus I
    - MAT 176: Calculus II
    - MAT 226: Vector Calculus
    - MAT 237: Discrete Mathematics
    - MAT 313: Linear Algebra
    - MAT 314: Algebra and Number Systems I
    - MAT 315: Algebra and Number Systems II
    - MAT 316: Theory of Numbers
    - MAT 320: Analysis I
    - MAT 323: Ordinary Differential Equations
    - MAT 341: Mathematical Logic
    - MAT 601: Secondary School Mathematics From an Advanced Standpoint
    - MAT 602: Introduction to Number Theory and Modern Algebra I
    - MAT 615: Modern Algebra
    - MAT 616: Algebra
    - MAT 655: Exploring Mathematics Using Technology
    - MAT 751: Theory of Functions of a Real Variable
    - MAT 753: Theory of Functions of a Complex Variable I
2. Wesleyan University (Spring Semester 2013)
    - Math 223: Linear Algebra
3. Bard College at Simon's Rock
    - Math 101: Math and Its Applications
    - Math 110: Introduction to Statistics
    - Math 210-211: Calculus I,II

- Math 220: Linear Algebra.
- Math 221: Vector Calculus
- Math 300T: Set Theory
- Math 300T: Mathematical Logic
- Math 312-313: Analysis I,II
- Math 320-321: Modern Algebra I,II
- Math 324T: Number Theory and Cryptography
- Math 331: Statistics II

4. Colgate University

   - Math 111-113: Calculus I-III
   - Cosc 290: Discrete Structures
   - Math 310: Combinatorial Problem Solving
   - Math 327: Geometry
   - Math 331: Theory of Numbers

5. Wesleyan University (Graduate Student)

   - Math 117: Introduction to Calculus, Part 1
   - Math 221: Vectors and Matrices
   - Math 500: Graduate Pedagogy

6. University of Oregon (Graduate Student)

   - Math 111: College Algebra

Service

1. Mathematical Community

   - Referee for the journal Dissertationes Mathematicae (February 2022 – June 2022)
   - Referee for the journal Quaestiones Mathematicae (July 2018 – December 2018)

2. Lehman College

   - Educator Preparation Policy Council, School of Education (2014–present)
   - Educational Policy Committee, Department of Mathematics (2016–present)
   - Academic Senate representative, Department of Mathematics (2017–2020)
   - Assessment Coordinator, Department of Mathematics (2016–present)
   - Member of Search Committee for Dean of School of Education (Spring 2018)
   - Created uniform syllabus and uniform final exam for MAT 132 (Spring 2018)
   - Member of Search Committee for Assistant Professor, School of Education (Fall 2019)
   - Member of Search Committee for Lecturers, Dept. of Mathematics (Spring 2020)
   - Graduate Advisor for the Pure Math MA program (Fall 2020–present)

- Graduate Advisor for the Advanced Certificate in Actuarial Mathematics program (Fall 2021–present)

3. Wesleyan University (2012–2013 Sabbatical)

   - Member of Preliminary Examination Committee for Leah Karker (PhD candidate)
   - Member of Thesis Defense Committee for Brett Townsend (PhD candidate)

4. Bard College at Simon's Rock

   - Committees

     Judicial (2013)
     AEP & Admissions Committee (2013)
     Community Council (2009–2010)
     Anti-Harrassment and Anti-Discrimination Committee (2010–2012)

   - Putnam Exam

     Putnam Practice Sessions (Fall, 2008–2011)
     Putnam Exam Proctor, Saturday, December 7th, 2013

   - Undergraduate Math/Science Events Chaperone

     Hudson River Undergraduate Mathematics Conference (April, 2009–2011)
     Mid-Hudson Mathematics Conference for Undergraduates, Bard College (October 2009)
     WIMIN Conference, Smith College (September 2008–2011)
     Bard Distinguished Lecture Series: S. James Gates, Jr., Bard College (March 2009)
     Bard Distinguished Lecture Series: Colin Adams, Bard College (September 2008)

   - Diversity Day panels

     Underrepresented groups in mathematics (November 2010)
     Women In Math and Science (November 2011)

   - Writing and Thinking Workshop (August 2011)

Curriculum Vitae
Zoltán I. Szabó

Academic rank:	Professor of mathematics
Date of birth:	April 10, 1948, Hungary
Education:	Ph.D., Szeged University, Hungary, 1975
	Thesis title: Structure theorems for Berwald spaces
	Advisor: Szoekefalvi Nagy Bela
	Master degree in mathematics, Szeged Univ., Hungary, 1973
Experience	
1993-present	Professor of Mathematics, Lehman College of CUNY, USA
2007-2008	Visiting Professor, Max Planck Inst., Leipzig, Germany
1990-1991	Visiting Professor, IHES, Bures Sur Ivette, France
1988-1989	Visiting Professor, Lehman College, CUNY, USA
1987-1988	Visiting Professor, Max Planck Inst., Bonn, Germany
1986-1987	Associate Professor, Budapest University, Hungary
1978-1986	Associate Professor, Szeged University, Hungary
1973-1978	Assistant Professor, Szeged University, Hungary

Appendix D

Department of Mathematics and Computer Science Self Evaluation Report From 2011-2012

Lehman College
Department of Mathematics and Computer Science

Self Evaluation

The **mission of the department** is threefold: to provide Lehman students with the skills necessary for quantitative and computationally assisted thinking and with the professional training and experience for STEM careers in industry, education, and government; to contribute to the world's body of knowledge through our scholarship; and to serve the community through advocacy for education and career preparation for women and minorities, training of teachers, and partnerships in industry.

The **specific goals of the department** likewise fall into three categories, pertaining to teaching, research, and service to the academic needs of our community, on campus and beyond:

1. Our departmental teaching goals are to provide:

- all students with the skills to obtain, analyze and draw conclusions from data; to develop abstract mathematical models needed to solve everyday problems; to use computers and computational tools effectively; and to think rigorously and reason abstractly
- our MAT (mathematic) majors with a solid grounding in algebra, analysis, geometry and probability/statistics
- our CMP (computer science) and CIS (computer information systems) majors with the ability to design and implement computer systems; to solve computational problems efficiently and correctly; and to integrate information systems with organizations to improve their functioning
- our CGI (computer graphics and imaging) majors with the technical skills and the ability to organize visual elements necessary to communicate concepts and embody experiences across a wide range of media
- students in quantitative majors (e.g. Economics, Biology) with the foundational knowledge to use mathematics and computers effectively in research and coursework

2. As an active member of the Lehman community, the department will:

- educate math and computer science majors in the tools of their field; members of the natural and social sciences with the tools from mathematics and computer science which they will need in order to purse their fields of research
- engage in efforts to include all students, especially women and minorities, in STEM fields
- collaborate with other academic departments at Lehman to promote the effective use of computers and mathematics in everyday life and work, and especially in other fields, such as science and economics, which use mathematics and computer science extensively.
- advocate for improvements in computer usage and environments at Lehman
- work with Bronx high schools and College Now to help prepare students to meet Lehman's rising standards of admission.
- collaborate with local community colleges regarding effective preparation for students transferring in to Lehman

To achieve these goals in a world that is changing technologically and economically, we will

- evaluate syllabi and delivery of specific course offerings and curricula for the department's majors in MAT, CMP, CIS and CGI. Specifically, we will
    - rework our business calculus sequence
    - bring our computing curriculum more in line with ACM curriculum standards, in particular, add a Software Engineering major.
    - request an evaluation of the CMP program by ABET (the computer science accreditation body).

- develop our honors precalculus and calculus courses to challenge our best-prepared students.
- continue to develop industrial and research internships, research projects, and other special career-oriented programs
- modify the M.A. Program for Secondary School Teachers of Mathematics so as to provide appropriate preparation for teaching the recently-revised New York State Common Core Learning Standards for Mathematics

3. Our research goals are as follows:

- **Computer Science;** A fundamental goal for the Computer Science research program is to continue its research in computationally intensive computing, an area of common interest among many current faculty and one that raises interesting issues in all core computer science fields. This requires better infrastructure for the department, for which we will apply to various sources, including governmental agencies like the NSF and corporations like NVIDIA. The current computer science research in the department suggests synergies among computational biology; bioinformatics; image processing; computer graphics and numerical, symbolic, and symbolic-numerical computations. The award of such an infrastructure grant to a department increases its visibility and improves its reputation and ability to hire.
- **Mathematics:** The research of the mathematics faculty is broadly based in all major fields of mathematics and the faculty has won numerous awards. A fundamental goal is to hire a new generation of mathematicians to continue a legacy of outstanding research.

Mathematicians and Computer Scientists at Lehman College (resumes in Appendix A) have always engaged in internationally recognized research. They have been directly involved with the training of the next generation of researchers, professionals and teachers in their fields. This has been in addition to their role in providing all Lehman students with the quantitative background they need to pursue the careers of their choice. To continue at the level that has been maintained for many years, we must continue to hire dynamic faculty.

4. Assessment Plans

- **Mathematics** (syllabi and hard copy of plan in Appendix B)

As we progress through the years, different courses will be assessed in order. Assessments of courses using the new system of outcomes began in Spring 2010. Assessments of the lower level courses, College Algebra-Calculus, will involve a reevaluation of uniform syllabi, which include careful scheduling of every chapter in the textbook. The calculus committee has always reevaluated such courses, but modern methods using outcomes only began in 2010. Assessments of advanced courses will be done on a more individual basis by faculty. Every semester, course outcomes will be tested on a final exam in all math courses. The schedule for thorough assessment of particular courses is on the Math Assessment Schedule Site (googledoc) Reports on the thoroughly assessed courses will become available at this site when they are completed.

Modern assessment of the lower level courses began with the collection of data for College Algebra on our uniform final in Spring 2010. This data consists of the scores of all students on each question of the uniform departmental final. These questions on the final directly measure the various outcomes for the course. In Fall 2010 we proceeded to Precalculus, then Calculus I in Spring 2011. Calculus II will be evaluated in Fall 2011 and then back to College Algebra over a two-year cycle. For each course, the assessment will begin with data collection, followed by analysis, followed by proposals to the Educational Policy Committee and ending with possible adjustments to the syllabi if needed. In addition to assessing for outcomes, we will continue our traditional methods of assessment in which a course is judged not only by progress of the students in the

course, but by their success in subsequent courses. For this reason we are assessing the sequence in ascending order.

More advanced courses without uniform syllabi will be assessed every few years by the faculty teaching the course. This assessment began with data collection on Geometry in Spring 2010 (a course designed with NSF funding through the MTTI program to train teachers to teach the new NYS HS curriculum). The Geometry course's outcomes are assessed through various problems on the final exam. Data on course projects has also been collected. In Fall 2010 data was collected on Analysis I (a required course in the math major) and on Discrete Math (another course to train teachers). In 2011, we will assess Linear Algebra and Modern Algebra. Analysis of the data will be completed the semester after the data is collected and faculty will be informed of the results so that they may adapt their courses accordingly. The data in each situation will consist of recording the performance of students on problems on the finals pertaining to each specific course objective.

The major itself will be assessed by directly testing students on their achievement of the math major outcomes in the required courses of the math major. For mathematics, every outcome is directly measured in multiple courses via final exams with an emphasis on *Technology* in the Calculus Laboratory Sequence (MAT155 and MAT156) and an emphasis on *Constructing a Rigorous Mathematical Argument* in Real Analysis (MAT320) and Modern Algebra (MAT314). Other outcomes of the mathematics major appear repeatedly throughout the major. Naturally students may take electives providing further emphasis on any particular outcome which is most relevant to their career path. Future teachers, in particular, are required to take Modern Geometry (MAT345) and Discrete Mathematics (MAT237). Students interested in enhancing their computer programming skills may elect to take Programming Methods I (CMP230) which is assessed as part of the Computer Science major. Each math course objective has been assigned one or more corresponding major objectives (see the syllabi). In this way we may progress through the assessment of the major outcomes as well as the courses' outcomes using the same direct measure: the final exam. The official Lehman College Charted Assessment Plan for the Math Major (googledoc) itemizes the outcomes of the major and how each is assessed.

Assessment Plans and Conclusions for Each Semester:

Spring 2010 Plan and Spring 2010 Plan, Data and Conclusions (completed)
Fall 2010 Plan and Conclusions (in progress)
Spring 2011 Plan

The Math Assessment Ambassador found it easier to create a website as a common repository for data and analysis rather than typing up a single report with appendices. This website is publicly viewable.

- **Computer Curricula.**

The assessment of the computer curricula, began in the Fall of 2010. The necessary beginning step was to establish the learning goals for the three majors (CMP, CIS, and CGI). These are included in Appendices D, E, and F, respectively. Next, a mapping was prepared from program learning objectives to courses for CIS and CMP courses (in appendices D and E). Third, we worked to bring the curricula for CIS and CMP in line with the ACM Curriculum Recommendations and to establish an assessment schedule beginning with the lower-level, multi-section courses.

The CIS curriculum presented a special challenge, since it has been taught primarily by adjuncts. Fortunately, most of the adjuncts have taught the courses long-term, providing some stability to their content. However, there were no standard syllabi and the curriculum had never been reviewed against any standard curricula. To address this, we assigned full-time professorial faculty to coordinate each CIS course, asking that they observe sections of their courses and develop initial standard syllabi for them. With the help of the adjuncts, syllabi including testable learning objectives were developed in the fall of 2010 and the spring of 2011 for the following nine courses:

- CIS 106 (Computer Literacy),
- CIS 166 (Computer Programming for Information Processing I),
- CIS 211 (Computer Information Systems)
- CIS 212 (Microcomputer Architecture)
- CIS 234 (Introduction to Spreadsheet Analysis)
- CIS 242 (Systems Analysis and Design)
- CIS 244 (Introduction to Database Management)
- CIS 331 (Introduction to Network Technologies)
- CIS 345 (Introduction to Operating Systems)

These syllabi are included in Appendix C.

Additionally, in the spring of 2011, we scheduled an assessment of the introductory course for the CIS major, CIS 211. As a result of this assessment, we modified the learning objectives to work better with our curriculum, and selected a new text that had less overlap with the material in the text for CIS 212, usually the second course for a student majoring in CIS. The two courses had converged over the years in such a way that both were covering information technology only, and we intend the CIS 211 course to focus instead on the use of information systems to support business objectives.

Also in the spring of 2011, we began a series of assessments for courses in the CMP major, starting with CMP 230. A new language, Python, was introduced as the introductory programming language in CMP230 in the Spring of 2011. The three sections of the course were taught collaboratively, using not only the same syllabus[1] but the same assignments and the same exams, graded in common. We will continue this practice in the future. Because of this major change to the course, this was an excellent time to assess it. We were pleased with a 75% pass rate on the course compared to a 50% pass rates in recent years for introductory programming at Lehman. We will try to get the pass rates for other CUNY colleges in the future.

For the fall of 2011, we are repeating the assessments of CIS 211 and CMP 230 and beginning to assess CIS 212 and CMP 326. Also, we are working to enforce the use of the standard syllabi as templates for the syllabi that the adjuncts use. This will be done through the assessment procedure, in which we will assess the learning objectives from the standard syllabus.

Department Overview

1. - Department Overview - Faculty

Faculty teaching mathematics in the department comprise a very prestigious group((resumes in Appendix A). A large percentage of the group are members of the doctoral faculty at the CUNY Graduate Center. Many hold or recently held NSF research grants. For many years Lehman was recognized as having the strongest mathematics faculty in all of CUNY. Indeed, several years ago, one of the national leaders in mathematics claimed that if we were a freestanding school we would be nationally ranked. It is getting harder to maintain that quality. Our teaching load is higher than comparable institutions and the pay is lower. We have had four of our best young faculty resign to go elsewhere. Their quality is attested to by the institutions they went to - Indiana, Minnesota, Wisconsin and London (as an aside, the faculty member who went to Indiana is now being recruited by Cal Tech). Three of the four left while holding NSF research grants and three were members of the doctoral faculty. We have not been allowed to replace the last two faculty members who resigned.

Faculty teaching computer science in the department are an equally prestigious group. Six are members of the doctoral faculty at the CUNY Graduate Center with three of them teaching there every year. Three members currently hold NSF research grants.

The department is very proud of the high quality of teaching by the full-time faculty members with four members of our department being winners of the Lehman College Teacher of the Year Award.

Many departmental faculty are also members of college committees. Some of the committees on which departmental members serve are:
Search Committee for VP for Information Technology, Search Committee for VP for Administration, Research Advisory Board, Technology Fee Committee, Senate Curriculum Committee, Senate Committee on Academic Standards and Evaluation, Senate Budget Committee, FP&B Committee on Committees, FP&B Budget Committee, FP&B Subcommittee on Tenure and the Executive Committee of the Faculty.

2. - Department Overview - Programs

Our department has five undergraduate majors, four undergraduate minors and three graduate programs.

The undergraduate majors are:

Mathematics B.A. - This is a fairly standard mathematics major targeting both students who wish to go to graduate school and students heading towards a teaching career.

Computer Science B.A. and B.S. - These programs target students heading to graduate school and students wishing to go to work in the computer industry. These majors need reviewing according to ABET accreditation guidelines and ACM curricular guidelines

Computer Information Systems B.S. - This major targets students who wish to become the computer specialist in a small office or work in an IT organization. This is our most popular

major. These students tend to be the weakest of our majors and we are slowly raising the standards in this major.

Computer Graphics and Imaging B.S. - This is a joint program with the Art department and targets, as its name implies, students who wish to work in computer graphics.

Our department has four undergraduate minors. In two of the minors, Mathematics and Computer Science, students must take several preliminary courses before getting into the upper level courses. This is due to the sequential nature of these disciplines, In the other two, Computer Applications and Computer Graphics, students can take some upper level courses as part of the minor. As the table in the data section that follows shows, Computer Applications (the minor corresponding to the Computer Information Systems major) is very popular and attracts many of the B.B.A. majors. In recent years, we have been raising the level of requirements for this minor.

Our three graduate programs are:

Computer Science M.S. - This is a program for students who want to go on to a Ph.D. program in Computer Science or for undergraduate Computer Science majors who wish to take more advanced courses before going on to or working in the computer industry.

Program for Secondary School Teachers of Mathematics MA - This program is designed to sharpen the math skills of young mathematics secondary school teachers en route to their professional license.

Mathematics M.A. - In general, this program is designed to prepare students to enter a doctoral program in mathematics. Its courses attract some of the better undergraduate students.

For some time, we were not accepting students into the pure math masters because there weren't enough applicants to justify offering a full range of advanced graduate math courses. Then, some five years ago, 10 teachers who were finishing or had already finished the TMA, had permanent licenses, and were teaching in N.Y.C. schools submitted a petition to our department: If we reopened matriculation in the pure mathematics masters, they would matriculate in it, and use the program to obtain their 30 post masters credits. They wanted the credits to enhance their salaries, of course, but they wanted to do this in a structured high quality program that would also give them a masters degree that could get them into a doctoral program, at some later time.

College Math Requirement - Our department is responsible for the College Math Requirement. Essentially, the requirement is that all students must take a 3 or 4 credit MAT course numbered above 125. Students who are going to major in the sciences generally take MAT 172 and 175 - the standard pre-calculus and calculus courses. Students majoring in Economics or Business Administration take MAT 171 and 174 - pre-calculus and calculus for Business. Most other students (approximately 1000 per year) take MAT 132 - Basic Concepts of Probability and Statistics. Many students (over 1000 per year) do not come to Lehman with sufficient background for these courses and take MAT 104 - College Algebra first. Some other students are not even prepared for MAT 104 and must take the workshops we offer in more elementary Algebra.

Special Programs -
a) Lehman-IBM Internship Program - For the past eleven years we have had an internship program with IBM. The program currently has eight students who spend two days a week on

research projects at IBM's Watson Research Lab in Hawthorne, NY. The program has over forty alumni, many of whom have gone on to work at other branches of IBM.

b) NSF Scholarship and Mentoring Program - This nine year old program has provided more than 150 students with substantial mentoring in addition to laptops and stipends of up to $3,000 per student. About forty students are currently in the program that is funded by a series of grants from the NSF totaling $1,100,000. Over 95% of the students in this program graduate.

c) MTTI (Math Teacher and Transformation Institute) - Four departmental faculty, one of whom is the Principal Investigator, are involved (together with faculty from Secondary Ed and the Institute for Literacy Studies) in a $5,000,000 NSF grant to train selected high school teachers. This program, the MTTI program, aims to prepare the teachers to better prepare their high school students for college level mathematics.

3. - Department Overview - Data
Number of Undergraduate Students per Program

Majors:	*Sep 2010*
Comp Sci-B.A.	7
Comp Sci-B.S.	71
CIS – B.S.	124
CGI – B.S.	34
Math – B.A.	86

Minors

Comp Science	13
Computer App	228
CGI	13
Math	15

Number of Graduate Students per Program:

Comp Sci – M.S.	21
Math M.A.	8
Teach Math M.A.	71

Headcount of Students Taking Courses in the Department - 3530.
This is more than any other department meaning that, in terms of student enrollment, we are the largest department in the college. We have 691 students that are in our majors taking our courses (counted multiple times in different courses).

Grant Funding per Year

20010-11	$7,608,192
2009-10	$1,894,402
2008-09	$2,008,341
2007-08	$381,962
2006-07	$920,715

Faculty Profile

Challenges

1. - Challenge – Lack of Professorial Contact

Our department is heavily reliant on the use of adjunct faculty and graduate students in the teaching of many of our courses. In Spring 2011:

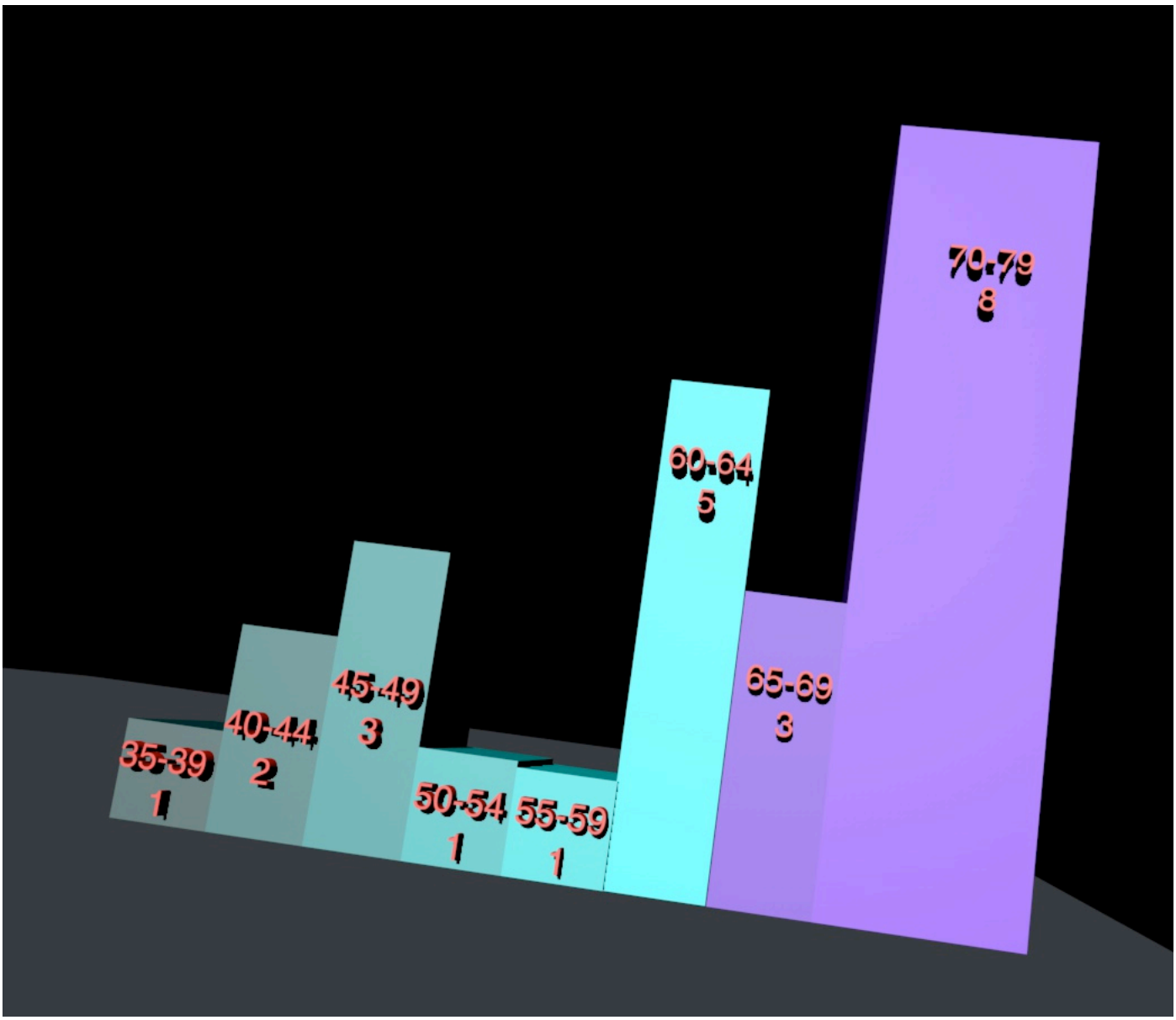
- 83% of our MAT courses are taught by adjuncts and graduate students.
- 97% of our CIS courses were taught by adjuncts and graduate students and 83% will be taught by adjuncts and graduate students in the fall of 2011
- 19% of our CMP courses were taught by adjuncts and graduate students; in the fall, that will be 25%
- 56% of our CGI courses were taught by adjuncts and graduate students.
- 63% of our sections (118 sections) were taught by adjuncts and graduate students.
- In MAT 104 (college algebra), the course taken by over 1000 students a year to prepare for the College Math Requirement, 100% of the sections were taught by adjuncts and graduate students.
- In MAT 132 (probability and statistics), the course taken by most of the college students to satisfy the College Math Requirement, 100% of the sections were taught by adjuncts and graduate students. It should be noted that when the department agreed to undertake the College Math Requirement, we were promised by Provost Wille that we would have enough full time lines to staff at least half of the courses in the College Math Requirement. Among the goals of Lehman College Strategic Planning Council Report for 2009-2019, is raising the level of the Colleges mathematics requirement.
- In MAT 171-174, the courses taken by Economics and B.B.A. students as part of their major, 92% of the sections were taught by adjuncts and graduate students.
- In MAT 172-175, the math courses taken by science majors in preparation for their major, 89% of the sections were taught by adjuncts and graduate students..

We have amassed adjuncts that excel in teaching courses up to college algebra and a few that excel in teaching higher-level courses. We need fulltime faculty teaching some sections of MAT 132 and MAT 104 (each course services over 1000 students a year). These faculty lend stability to the courses and give us necessary information to continually adjust the syllabi. We need professorial faculty cognizant of advances in probability and statistics closely monitoring MAT 132. It is a concern that students in mathematics often do not consistently meet professorial faculty early in their studies. It is a concern that students regularly do not meet professorial faculty in CIS.

2. - Challenge - Aging of the Faculty

The Lehman College Strategic Planning Council Report for 2009-2019 expresses concern that at present 85 of Lehman's 373 full-time faculty are 65 years of age or older and 143 are 60 or over. In terms of percentages, 22.8% of the college's faculty are 65 or older and 38.3% are 60 or older. These figures of concern over the aging of the Lehman faculty pale when compared to those of our department. In our department, 8 out of 24 (33%) ***are***

70 or older**,** 11 out of 24 (46%) are 65 or older and 16 out of 24 (67%) are 60 or older. The problems of large use of part time faculty will grow as these faculty leave. There are several higher-level courses taught by non-professorial staff. The percentage of higher-level courses inappropriately staffed will grow. We will not be able to offer numbers of higher-level courses. Unless we are given new professorial lines we are headed towards a departmental default. The present faculty is distinguished and attracts new personnel of high quality and has helped the reputation of the school. Resuscitating the department after the professorial faculty has contracted to a small core may be a long and arduous chore.



3. - Challenge - Other areas:

Aside from concerns about the over-reliance on adjuncts and the aging of the faculty, other major concerns of our department are:

- There are 15 multi-section courses of 4 or more sections in the Spring 2010 semester. In 7 of those 15, there are no professorial member teaching and adding stability to the courses.
- Because of the lack of a computer technician, access to the one computing lab is limited to class hours, but students need extensive access including nights and weekends.
- All computing fields require labs and lab support flexible enough to accommodate yearly changes as technology changes, but there are no supporting lab technicians for the Computer Science classroom and faculty research labs.
  There is no lab space for Computer Science students to do their work and experiment on their own and not have to compete with students doing word processing or surfing the Internet. At the November meeting of the Lehman College Senate, this was expressed by the students as their prime concern.
- The computing infrastructure commonly found in corporate and government offices and other college campuses should be available to Lehman College faculty and students. In particular there should be campus-wide availability of share drives together with login from any location. This is something departmental faculty would work on together with the IT staff.
- The above problems could be alleviated by investigating the use of cloud computing, but students will be required to have Internet access to take full advantage of this.
- For lack of sufficient funding, students do not have sufficient access to tutoring for computer science or CIS courses, in particular in the programming courses.
- Because of the lack of sufficient professorial faculty, we have not been able to offer all the requested graduate mathematics courses for teachers.
- Because of the lack of sufficient professorial faculty, we have not been able to offer an evening section of the basic mathematics course for prospective teachers.
- Because of the lack of sufficient professorial faculty we tried to have an adjunct teach an axiomatic geometry course for prospective teachers with disastrous results.
- Because of the lack of sufficient qualified faculty, we are unable to offer a course in network security in either the CIS or the CMP curriculum, both of which require such a course, and we have difficulty offering the popular and important e-commerce course in the CIS curriculum.
- Because of the lack of sufficient professorial faculty, we have had to turn down a recent request by a local high school to develop with them a Mathematics Partnership grant with the NYS Department of Education

5. Curricular Plans

- Members of the P&B Committee feel that the department should split into separate mathematics and computer science departments.
- Together with faculty from the Department of Biological Sciences, we have instituted a joint Quantitative and Systems Biology minor. The first course in the major will be taught in the fall, although it will be taught as a topics course because the approval wasn't granted until late in the spring. The respective department chairs will ensure that students get appropriate credit toward a minor if they want it. This is of interest to students in both departments and is one of the recommendations of the Lehman College Strategic Planning Council Report for 2009-2019
- Less advanced in the planning stage is an Information Security minor. This will require hiring a knowledgeable faculty member.
- We are looking into getting ABET certification for our Computer Science programs (City College and College of Staten Island have this certification). While we expect that our programs will be near the levels required for this certification, it is likely we will have to offer some courses on a more regular basis.

- We would like to develop some calculus-based courses in the Mathematics of Finance. A topics course in this area was taught in Spring 2010 (and was very well received) but the faculty member who taught it resigned.
- In the light of all the talk (in Tweed, Albany and Washington) about getting better trained math teachers, we are planning on strengthening the courses and course requirements in the TMA program. Some courses are currently being tested in the NSF funded MTTI program and we are planning on introducing them to the TMA program.
- As CUNY enters its "Decade of Science" we would like to add Honors sections of our calculus courses and eventually, computer science. It should be noted that the number of students taking Calculus I has increased by 65% from Spring 2009 to Spring 2010. We are part of a grant organized at the CUNY graduate center to create honors sections in mathematics. Given the department's paucity of professorial faculty and its demographics we may have trouble staffing these sections.
- We would like to add a follow-up Computer Literacy course that would emphasize group wise skills such as finding, obtaining, and preparing documents and presentations; using various forms of groupware to contribute to group projects, e.g. using wikis; finding and using publicly available relevant data bases to a specific topic and preparing arguments and presentations based on the data.
- Skilled personnel in computer-related fields are very much in demand: Two of the top 4 (and 4 of the top 30) careers as rated by the US Bureau of Labor statistics are sub-fields of Computer Science for the years 2006-2016. IBM has determined that 50% of its own and its customers' IT staffs are currently eligible to retire. Both these facts indicate that there will be many jobs available for properly prepared students. This should result in an increase in enrollment in Computer Science courses and is already in evidence in the increase in enrollment in the lower level courses for the major.

6. Resources Needed

1. - **Resources Needed - Faculty**

In the previous sections, mainly Adjunct Usage (actually over-usage) and Aging of the Faculty, but also in the Curricular Plans and Other Areas of Concern, we clearly showed the need for a substantial increase in the number of faculty. In particular, in the five areas listed under Adjunct Usage, the need for professorial faculty in our department is a need not only for students in our department but also by many of the students in the college.

In a previous section, we indicated that we had had four resignations of young mathematicians in the past 6 years. The last two were clearly not replaced despite the over usage of adjuncts by our department. During 2010-2011 we have had one more resignation, two retirements and one faculty not given tenure. We have been able to hire one lecturer but we have had a net loss of three faculty members. We are definitely headed downhill.

The section Aging of the Faculty indicates very clearly that we will lose many faculty in the next 5 years. Together with the over usage of adjuncts it would be wise to average about 3 to 4 hires in each of the next 5 years. This has to be done in a methodical way, not by just replacing faculty as they retire. First of all, there is a need for additional faculty, Secondly, if we started searching after faculty announced their retirements (and finished their Travia leaves), we would have at least a one years lag in hiring. Thirdly, if we hire 2 in one year and 6 in the next, we would be hiring, at best, our fifth and sixth choices instead of our third and fourth (if we were to hire 4 in each year).

We would like to return to the pre-eminent position we previously had in the national mathematics community and in CUNY. That means hiring top-notch faculty regardless of area. We would like to hire at the level of the four young mathematicians who resigned in the past five years to go to top level schools elsewhere. Our department in previous years has

done well by hiring the best available mathematicians and then arranging for them to go into the specific areas of need. For example, a topologist was developing a course in the Mathematics of Finance (before he resigned), a Teichmuller specialist is developing an expertise in Statistics because of departmental needs and a Differential Geometer has just received a $5,000,000 grant in teacher training. Incidentally, all three were recipients of NSF funding in their own areas of research.

We would like at least 3 professorial lines for computational research, with emphasis on scientific computing in collaboration with bio and chemistry, parallel processing, numeric analysis, and complexity theory. The need for these lines has been amply demonstrated in the sections Challenge – Lack of Professorial Contact and Challenge - Other Areas. It has been particularly demonstrated in the section on Curricular Plans. It should be noted that among the tenured faculty teaching computer science there are only two under the age of 60. Because of the economy, many of the more prestigious computer companies are not hiring and are, in fact, laying off people. We should seize the moment to hire the top-notch computer scientists we need now and for the immediate future.

In CIS we should hire at least 3 researchers with interests in health information systems or management information systems or operations research.

2. - **Resources Needed - Support Staff**

The current staff supports the calculus labs, labs for statistics and the computer applications program but has no time to support the unique needs of a dynamic teaching curriculum or active research program including those that involve undergraduate students in Computer Science. Additional technical support, via full-time College Lab Technicians or HEO's, is needed.

The instructional program needs one such person to support setting up course laboratories with appropriate hardware and software and to help maintain access to labs at night and on weekends. On-line access to CS labs through the Lehman vpn (Virtual Private Network) would be acceptable in some situations, but remote access is a requirement.

The research program needs another such person to support setting up research labs, backing up necessary files, making sure of appropriate remote access to the labs, protecting the Lehman networks from unnecessary interference, helping to find and purchase appropriate hardware and software, and other needs as determined by research faculty.

3. - **Resources Needed - Equipment and Labs**

There is a need for additional labs for our students. The labs need to be well equipped with computers, routers, printers, switches, and other equipment, so that the students can experiment for class assignments and on their own. As indicated earlier, at the November meeting of the Lehman College Senate, the student leadership called this their highest priority

Computer Science faculty require individual labs to do experimental research and such labs are required to attract new faculty. In addition, large computational facilities, including the ability to store and share large amounts of data, are required so that large research problems can be addressed.