Daniel A. Klain

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Education

Ph.D. Mathematics, MIT, 1994.
Thesis: *Star Measures and Dual Mixed Volumes*,
supervised by Prof. Gian-Carlo Rota.

S.B. Mathematics, MIT, 1990.

Professional History

Professor
Department of Mathematics and Statistics,[1] University of Massachusetts, Lowell, 2007–present.

Professor and Department Chair
Department of Mathematical Sciences, University of Massachusetts, Lowell, 2016–2018.

Associate Professor (with tenure)
Department of Mathematical Sciences, University of Massachusetts, Lowell, 2001–2007.

Associate Professor (with tenure)
School of Mathematics, Georgia Institute of Technology, 2000–2002.

Assistant Professor
School of Mathematics, Georgia Institute of Technology, 1994–2000.

Postdoctoral Fellow
Mathematical Sciences Research Institute, Berkeley, Spring 1996.

Visiting Scholar
Department of Mathematics, MIT, Summer 1995 and 1996.

Graduate Teaching Staff
Experimental Study Group (ESG), MIT, Fall Semester 1993.

Number Theory Counselor
Program in Mathematics for Young Scientists (PROMYS)
Department of Mathematics, Boston University, Summer 1989 and 1990.

Awards and Honors

Mathematical Sciences Teaching Excellence Award, UMass Lowell, 2003, 2010, 2013, and 2022.
Sigma Xi Young Faculty Award, Georgia Tech, 2000.
National Science Foundation Graduate Fellowship, 1990.
Jon A. Bucsela Prize in Mathematics, MIT, 1990.
Phi Beta Kappa, MIT, 1990
National Merit Scholar (Raytheon Corporate Merit Scholarship), 1986.

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[1]formerly the *Department of Mathematical Sciences.*

Publications

Articles

1. E. Grinberg and D. Klain, A most significant question about powers of two, to appear in *Mathematics Magazine*.

2. T. Khovanova and D. Klain, What's for dessert?, *The Mathematical Intelligencer*, **47** (2025), no. 1, 28-34. https://doi.org/10.1007/s00283-024-10352-3

3. D. Klain, Tetrahedra with congruent facet pairs, *The Mathematical Intelligencer*, **45** (2023), no. 3, 251-255. https://doi.org/10.1007/s00283-022-10228-4

4. D. Klain, A probabilistic proof of the spherical excess formula, *The American Mathematical Monthly*, **128** (2021), no. 1, 70-72. https://doi.org/10.1080/00029890.2021.1839303

5. C. Chen, T. Khovanova, and D. Klain, Volume bounds for shadow covering, *Transactions of the American Mathematical Society*, **366** (2014), no. 3, 1161-1177. https://doi.org/10.1090/S0002-9947-2013-05855-2

6. D. Klain, Steiner symmetrization using a finite set of directions, *Advances in Applied Mathematics*, **48** (2012), no. 2, 340-353. https://doi.org/10.1016/j.aam.2011.09.004

7. G. Bianchi, D. Klain, E. Lutwak, D. Yang, and G. Zhang, A countable set of directions is sufficient for Steiner symmetrization, *Advances in Applied Mathematics*, **47** (2011), no. 4, 869-873. https://doi:10.1016/j.aam.2011.04.005

8. D. Klain, On the equality conditions of the Brunn-Minkowski theorem, *Proceedings of the American Mathematical Society*, **139** (2011), no. 10, 3719-3726. https://doi.org/10.1090/S0002-9939-2011-10822-0

9. D. Klain, If you can hide behind it, can you hide in inside it?, *Transactions of the American Mathematical Society*, **363** (2011), no. 9, 4585-4601. https://doi.org/10.1090/S0002-9947-2011-05178-0

10. D. Klain, Containment and inscribed simplices, *Indiana University Mathematics Journal*, **59** (2010), no. 4, 1231-1244. https://doi.org/10.1512/iumj.2010.59.4067

11. D. Klain, Covering shadows with a smaller volume, *Advances in Mathematics*, **224** (2010), no. 2, 601-619. https://doi.org/10.1016/j.aim.2009.12.008

12. D. V. Feldman and D. Klain, Angles as probabilities, *The American Mathematical Monthly*, **116** (2009), no. 8, 732-735. https://doi.org/10.4169/193009709X460868

13. K. Rybnikov, K. Daniels, D. Klain, B. Jones, and V. Durante, Estimation of Euler Characteristic from Volumetric Data, *Fourth International Symposium on 3D Data Processing, Visualization and Transmission*, Georgia Institute of Technology, June 18-20, 2008.

14. D. Klain, Bonnesen-type inequalities for surfaces of constant curvature, *Advances in Applied Mathematics*, **39** (2007), 143-154. https://doi.org/10.1016/j.aam.2006.11.004

15. D. Klain, Isometry invariant valuations on hyperbolic space,
Discrete and Computational Geometry, **36** (2006), no. 3, 457-477.
`https://doi.org/10.1007/s00454-006-1251-6`

16. D. Klain, An error estimate for the isoperimetric deficit,
Illinois Journal of Mathematics, **49** (2005), no. 3, 981-992.
`https://doi.org/10.1215/ijm/1258138231`

17. D. Klain, An intuitive derivation of Heron's formula,
The American Mathematical Monthly, **111** (2004), no. 8, 709-712.
`https://doi.org/10.1080/00029890.2004.11920133`

18. D. Klain, The Minkowski problem for polytopes,
Advances in Mathematics, **185** (2004), 270-288.
`https://doi.org/10.1016/j.aim.2003.07.001`

19. D. Klain and Joseph P. S. Kung, Continuous and profinite combinatorics,
in *Gian-Carlo Rota on Analysis and Probability,* edited by Jean Dhombres, Joseph Kung and Norton Starr. (Boston: Birkhäuser Verlag, 2003), pp. 290-292.

20. D. Klain, Free polygon enumeration and the area of an integral polygon,
Discrete Mathematics, **218** (2000), 109-119.
`https://doi.org/10.1016/S0012-365X(99)00340-4`

21. D. Klain, Even valuations on convex bodies,
Transactions of the American Mathematical Society, **352** (2000), 71-93.
`https://doi.org/10.1090/S0002-9947-99-02240-0`

22. D. Klain, An Euler relation for valuations on polytopes,
Advances in Mathematics, **147** (1999), 1-34.
`https://doi.org/10.1006/aima.1999.1831`

23. D. Klain, Kinematic formulas for finite vector spaces,
Discrete Mathematics, **179** (1998), 121-132.
`https://doi.org/10.1016/S0012-365X(97)00031-9`

24. D. Klain, Kinematic formulas for finite lattices,
Annals of Combinatorics, **1** (1997), 353-366.
`https://doi.org/10.1007/BF02558486`

25. D. Klain and G.-C. Rota, A continuous analogue of Sperner's theorem,
Communications on Pure and Applied Mathematics, **50** (1997), 205-223.
`https://doi.org/10.1002/(SICI)1097-0312(199703)50:3<205::AID-CPA1>3.0.CO;2-F`

26. D. Klain, Invariant valuations on star-shaped sets,
Advances in Mathematics, **125** (1997), 95-113.
`https://doi.org/10.1006/aima.1997.1601`

27. D. Klain, Star valuations and dual mixed volumes,
Advances in Mathematics, **121** (1996), 80-101.
`https://doi.org/10.1006/aima.1996.0048`

28. D. Klain, A short proof of Hadwiger's characterization theorem,
Mathematika, **42** (1995), 329-339.
`https://doi.org/10.1112/S0025579300014625`

Books

Introduction to Geometric Probability, with Gian-Carlo Rota,
(New York: Cambridge University Press, 1997).

Books in progress

Introduction to Convex Geometry. (current draft with 304 pages)

Essentials of Number Theory. (current draft with 202 pages)

Research Grants

2003-2005   *Verification of Properties of Geometric Structures and Reconstruction of Geometric Objects from Partial Information*
Co-PI (with K. Daniels, PI, and K. Rybnikov, Co-PI)
NSF (Division of Mathematical Sciences) DMS-0310589, $100,000.

1998-2004   *Convex Geometry and Geometric Invariant Theory*
NSF (Geometric Analysis) DMS-9803571, $78,591.

1996-1998   *Mixed Volumes*
NSF (Geometric Analysis) DMS-9626688, $40,000.

Professional Service (internal)

UMass Lowell

Chair, Mathematics Personnel Committee, Fall 2007–Spring 2016, Fall 2019, Fall 2024-present.
Member, Mathematics Undergraduate Curriculum Committee, Fall 2018–Present.[2]
Member, Mathematics Personnel Committee, Fall 2007–Present.[3]
Department Chair, Mathematical Sciences, Summer 2016–Summer 2018.
Chair, College Personnel Committee, Fall 2017–Spring 2018.
Member, University Rank and Tenure Committee, Fall 2017–Spring 2018.
KCS Faculty Mentor, Fall 2019-Spring 2023.
Faculty Senator, Fall 2002–Spring 2007, Spring 2011–Spring 2019.
Chair, Mathematics Hiring Committee, 2004–2006, Fall 2011, Spring 2014–Spring 2017.
Faculty Advisor, Undergraduate Math Club, 2001–2014.

M.S. Thesis committee member for Madison Cunningham, Mathematics & Statistics, Fall 2022.
M.S. Thesis committee member for Rebecca Mendum, Mathematics & Statistics, Spring 2024.
Senior project supervisor for 28 undergraduate senior projects, 2003–Present.

Georgia Tech

Faculty Advisor, Pi Mu Epsilon, Georgia Beta chapter, 1996–2000.
Freshman Experience Faculty Partner, Fall 1995, 1998–1999.
Member, Mathematics Graduate Committee, Fall 1997–Spring 1999.
Combinatorics Seminar Chair, Fall 1998.
Member, Mathematics Faculty Advisory Committee, Fall 1998.
Mathematics Colloquium Chair, Fall 1997–Spring 1998.
Member, Mathematics Undergraduate Committee, Fall 1995–Spring 1997.
Member, Mathematics Graduate Comprehensive Exam Committee, Fall 1996–Spring 1997.

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[2]Except sabbatical terms.
[3]Except sabbatical terms.

Professional Service (external)

Organized (with M. Ludwig and F. Schuster) AMS Special Session, *Convex and Integral Geometry*, for the Fall Eastern Sectional Meeting, Middletown, CT, in October 2008.

Organized (with B. Monson and E. Schulte) AMS Special Session, *Discrete and Convex Geometry*, for the Fall Eastern Sectional Meeting, Durham, NH, in April 2006.

Organized (with E. Werner) AMS Special Session, *Convex Geometry*, for the Fall Eastern Sectional Meeting, Boston, MA, in October 2002.

Organized (with E. Werner) AMS Special Session, *Invariance in Convex Geometry*, for the Spring Eastern Sectional Meeting, Lowell, MA, in April 2000.

Referee for journals and grant agencies including *Trans. Amer. Math. Soc.*, *Adv. Math.*, *Proc. Amer. Math. Soc.*, *Proc. Nat. Acad. Sci.*, *Adv. in Appl. Math.*, *Indiana Univ. Math. J.*, *Math. Z.*, *Discrete Comput. Geom.*, *Positivity*, *Bull. Aust. Math. Soc.*, *Amer. Math. Monthly*, the Austrian Science Fund (FWF), and the National Science Foundation.

Conferences and Seminars

2019	University of Massachusetts Lowell – *Pi Mu Epsilon Induction Presentation*
	University of Massachusetts Lowell – *Kennedy College of Sciences Conversation Starter*
2012	Polytechnic Institute of NYU – *Colloquium*
	Binghamton University – *Combinatorics Seminar*
	CRM, University of Montreal – *Workshop on Convexity and Asymptotic Geometric Analysis*
2011	Boston University – *PROMYS Guest Lecture*
	Cortona, Italy – *Fifth International Workshop on Convex Geometry - Analytic Aspects*
	University of Massachusetts Lowell – *Colloquium*
	University of Massachusetts Boston – *Mathematics Seminar*
2010	Fields Institute, Toronto – *Thematic Program on Asymptotic Geometric Analysis*
	University of Massachusetts Lowell – *Pi Mu Epsilon Induction Presentation*
2009	Tufts University – *19th Annual Fall Workshop on Computational Geometry*
	Polytechnic Institute of NYU – *Colloquium*
	Worcester, MA – *AMS Special Session (Discrete Geometry and Combinatorics)*
	University of Massachusetts Lowell – *Colloquium*
	University of Massachusetts Lowell – *Pi Mu Epsilon Induction Presentation*
2008	Case Western Reserve University – *Colloquium*
	University of New Hampshire – *Colloquium*
	Middletown, CT – *AMS Special Session (Convex and Integral Geometry)* (co-organizer)
	Dalhousie University – *Colloquium* and *Analysis Seminar*
	Polytechnic Institute of NYU – *Colloquium*
2007	Dalhousie University – *AARMS Analysis Days (Conference in honour of A. C. Thompson)*
2006	Durham, NH – *AMS Special Session (Discrete and Convex Geometry)* (co-organizer)
	University of Massachusetts Lowell – *Undergraduate Lunch Seminar*
2005	University of Montreal – *Colloquium*
	Dalhousie University – *AARMS Summer Graduate School Lectures*
2004	University of Milan, Italy – *Gian-Carlo Rota Memorial Lecture*
2003	Northeastern University – *GASC Seminar*
	Binghamton, NY – *AMS Special Session (Topological Combinatorics)*
	Polytechnic University, Brooklyn – *Colloquium*
	University of New Hampshire – *Colloquium*

2002   HRUMC 2002 – *Special Session*
Polytechnic University, Brooklyn – *Colloquium*
Boston, MA – *AMS Special Session (Convex Geometry)* (co-organizer and speaker)
University of Massachusetts Lowell – *Colloquium*

2001   University of Massachusetts Lowell – *Colloquium*

2000   Washington, D.C. – *AMS Special Session (Gian-Carlo Rota Memorial)*
Lowell, MA – *AMS Special Session (Invariance in Convex Geometry)* (co-organizer)

1999   UCSD – *Combinatorics Seminar*
MIT – *Combinatorics Seminar*
Georgia Institute of Technology – *Colloquium*
Georgia Institute of Technology – *Combinatorics Seminar*
Columbus State University – *SAAC Lecture*
University of Memphis – *Colloquium*
University of Georgia, Athens – *Geometry Seminar*
Georgia Institute of Technology – *Geometry/Topology Seminar*
University of South Carolina – *Colloquium*
Temple University – *SUM/SAAC Lecture* and *Colloquium*
Texas A&M, College Station – *SAAC Lecture* and *Combinatorics Seminar*
Cortona, Italy – *Second International Workshop on Convex Geometry - Analytic Aspects*

1998   Georgia Institute of Technology – *Combinatorics Seminar*
Polytechnic University, Brooklyn – *Colloquium*
University of Georgia, Athens – *9th Annual Southeastern Geometry Conference*
St. John, New Brunswick – *CMS Summer Meeting (Session in Convex Geometry)*
Clemson University – *Algebra and Discrete Mathematics Seminar*
Case Western Reserve University – *Colloquium*

1997   Memphis, TN – *AMS Special Session (Harmonic Analysis and Convexity)*
University of South Carolina – *Analysis Seminar*
Georgia Institute of Technology – *Combinatorics Seminar*
University of Georgia, Athens – *Geometry Seminar*
Oberwolfach, Germany – *Combinatorial Convexity and Algebraic Geometry*
Oberwolfach, Germany – *Convex Geometry*
University of Kiel, Germany – *Analysis Seminar*

1996   MSRI – *Convex Geometry Seminar* (February)
MSRI – *Workshop in Random Methods in Convex Geometry*
MSRI – *Convex Geometry Seminar* (March)
MIT – *Rotafest*
UCSD – *Combinatorics Seminar*
Boston University – *PROMYS Guest Lecture*
Dalhousie University – *Conference on the Affine Geometry of Convex Sets*

1995   Georgia Institute of Technology – *Probability Seminar*
MIT – *Combinatorics Seminar*
Temple University – *Analysis Seminar*
Georgia Institute of Technology – *Combinatorics Seminar*
Guanajuato, Mexico – *AMS/SMM Special Session (Convexity and Combinatorial Geometry)*

1994   Brooklyn, NY – *AMS Special Session (Geometric Convexity)*
Northeastern University – *Combinatorics Seminar*
Emory University – *Analysis Seminar*

Teaching Experience

1993	Fall	MIT ESG 18.01	Calculus I
	Fall	MIT ESG 18.02	Calculus II
1994	Fall	GT Math 4320A	Complex Variables
1995	Winter	GT Math 1508G4	Calculus II
	Winter	GT Math 1508L1	Calculus II
	Spring	GT Math 1509N1	Calculus III
	Fall	GT Math 4305A2	Finite Dimensional Vector Spaces
	Fall	GT Math 4431A	Introductory Topology
1996	Fall	GT Math 4305A2	Finite Dimensional Vector Spaces
1997	Winter	GT Math 1509J	Calculus III
	Winter	GT Math 4305A	Finite Dimensional Vector Spaces
	Spring	GT Math 3017A	Transition to Higher Mathematics
	Spring	GT Math 4305A	Finite Dimensional Vector Spaces
	Fall	GT Math 4431A	Introductory Topology
	Fall	GT Math 6111A	Algebraic Structures
1998	Winter	GT Math 8223A	Convex and Integral Geometry
	Spring	GT Math 1509C3	Calculus III
	Spring	GT Math 7761A	Convex Analysis and Polyhedra
	Fall	GT Math 4305A	Finite Dimensional Vector Spaces
	Fall	GT Math 6111A	Algebraic Structures
1999	Winter	GT Math 1508G4	Calculus II
	Spring	GT SAAC Representative	
	Fall	GT Math 2402A	Introduction to Linear Algebra
	Fall	GT Math 6121A	Algebra I
2000	Spring	GT Math 6122A	Algebra II
2000	Fall	Sabbatical	
2001	Spring	Sabbatical	
2001	Fall	UML 92.221	Linear Algebra I
	Fall	UML 92.321	Discrete Structures II
2002	Spring	UML 92.222	Linear Algebra II
	Spring	UML 92.513	Number Theory
	Spring	UML Directed Study	Abstract Algebra
	Spring	UML Directed Study	Riemannian Geometry
	Fall	UML 92.221	Linear Algebra I
	Fall	UML 92.421	Abstract Algebra I
2003	Spring	UML 92.222	Linear Algebra II
	Spring	UML 92.321	Discrete Structures II
	Fall	UML 92.141	Honors Calculus I
	Fall	UML 92.221	Linear Algebra I
	Fall	UML 92.513	Number Theory
2004	Spring	UML 92.222	Linear Algebra II
	Spring	UML Directed Study	Graph Theory
	Fall	UML 92.221	Linear Algebra I
	Fall	UML 92.513	Number Theory
2005	Spring	UML 92.222	Linear Algebra II
	Spring	UML 92.132	Calculus II
	Summer	Dalhousie University - AARMS	Convex Geometry
	Fall	UML 92.221	Linear Algebra I
	Fall	UML 92.523	Linear Algebra
	Fall	UML Directed Study	Number Theory
	Fall	UML Directed Study	Geometry of Surfaces

2006	Spring	UML 92.222	Linear Algebra II
	Spring	UML 92.231	Calculus III
	Fall	UML 92.231	Calculus III
	Fall	UML 92.513	Number Theory
2007	Spring	UML 92.142	Honors Calculus II
	Spring	UML 92.231	Calculus III
	Fall	UML 92.132	Calculus II
	Fall	UML 92.513	Number Theory
	Fall	UML 92.651	Convex Geometry
2008	Spring	UML 92.231	Calculus III
	Spring	UML 92.521	Algebraic Structures
	Fall	UML 92.132	Calculus II
	Fall	UML 92.513	Number Theory
2009	Spring	UML 92.142	Honors Calculus II
	Spring	UML 92.411	Complex Variables I
	Fall	UML 92.131	Calculus I
	Fall	UML 92.221	Linear Algebra I
2010	Spring	UML 92.420	Mathematical Problem Solving
	Spring	UML 92.651	Convex Geometry
	Fall	Sabbatical	
2011	Spring	UML 92.420	Mathematical Problem Solving
	Spring	UML 92.513	Number Theory
	Fall	UML 92.131	Calculus I
	Fall	UML 92.132	Calculus II
2012	Spring	UML 92.321	Discrete Structures I
	Spring	UML 92.420	Mathematical Problem Solving
	Fall	UML 92.231	Calculus III
	Fall	UML 92.322	Discrete Structures II
2013	Spring	UML 92.386	Probability and Statistics I
	Spring	UML 92.513	Number Theory
	Fall	UML 92.321	Discrete Structures I
	Fall	UML 92.322	Discrete Structures II
2014	Spring	UML 92.386	Probability and Statistics I
	Spring	UML 92.360	Mathematical Structures for Computer Engineers
	Fall	UML 92.241	Honors Calculus III
	Fall	UML 92.386	Probability and Statistics I
2015	Spring	UML 92.360	Mathematical Structures for Computer Engineers
	Spring	UML 92.413/513	Number Theory
	Fall	UML 92.221	Linear Algebra I
	Fall	UML 92.386	Probability and Statistics I
2016	Spring	UML Math 2210	Linear Algebra I
	Spring	UML Math 3600	Mathematical Structures for Computer Engineers
	Fall	UML Math 3860	Probability and Statistics I
	Fall	UML Math 6510	Galois Theory (Directed Study)
	Fall	UML Math 6510	Convex Geometry (Directed Study)
2017	Spring	UML Math 4130/5130	Number Theory
	Spring	UML Math 6510	Abstract Algebra (Directed Study)
	Fall	UML Math 4210/5210	Abstract Algebra I
2018	Spring	UML Math 3860	Probability and Statistics I
	Spring	UML Math 6510	Analytic Number Theory (Directed Study)
	Fall	UML Math 2220	Linear Algebra II
	Fall	UML Math 3860	Probability and Statistics I

2019	Spring	UML Math 3860	Probability and Statistics I
	Spring	UML Math 4070/5090	Probability and Mathematical Statistics
	Fall	UML Math 2220	Linear Algebra II
	Fall	UML Math 4070	Probability and Mathematical Statistics I
2020	Spring	Family Leave	
	Fall	Sabbatical	
2021	Spring	UML Math 2830	Introduction to Statistics (2 sections)
	Fall	UML Math 2220	Linear Algebra II
	Fall	UML Math 4070	Probability and Mathematical Statistics I
2022	Spring	UML Math 3860	Probability and Statistics I
	Spring	UML Math 4070/5090	Probability and Mathematical Statistics
	Fall	UML Math 4070	Probability and Mathematical Statistics I
	Fall	UML Math 5090	Probability and Mathematical Statistics
2023	Spring	UML Math 3860	Probability and Statistics I
	Spring	UML Math 4070/5090	Probability and Mathematical Statistics
	Fall	UML Math 3220	Discrete Structures II
	Fall	UML Math 4070/5090	Probability and Mathematical Statistics
2024	Spring	UML Math 3220	Discrete Structures II (2 sections)
	Fall	UML Math 3220	Discrete Structures II
	Fall	UML Math 5840	Stochastic Processes
2025	Spring	UML Math 3220	Discrete Structures II
	Spring	UML Math 4860/5880	Probability and Mathematical Statistics II