

# Blake Mellor

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## Positions Held

- 2012-present: Professor of Mathematics, Loyola Marymount University
- 2007-2012: Associate Professor of Mathematics, Loyola Marymount University
- 2002-2007: Assistant Professor of Mathematics, Loyola Marymount University
- 1999-2002: Assistant Professor of Mathematics, Honors College, Florida Atlantic University
- 1994-1999: Graduate Student Instructor, University of California, Berkeley

## Education

- 1999: Ph.D. Mathematics, University of California, Berkeley  
Dissertation: "Finite Type Link Homotopy Invariants," under Professor Robion Kirby
- 1993: B.A., Mathematics, magna cum laude, Harvard University  
Thesis: "Heegaard Splittings and Casson's Invariant," under Professor Clifford Taubes

## Peer-reviewed Papers

1. "Symmetries of embedded complete bipartite graphs," with E. Flapan, N. Lehle, M. Pittluck and X. Vongsathorn, 2012, available at *arXiv:1205.4052*, to appear in *Fundamenta Mathematicae*
2. "The Mathematics of Symmetry and Attitudes towards Mathematics," in *Doing the Scholarship of Teaching and Learning in Mathematics*, ed. C. Bennett and J. Dewar, MAA Notes, 2014 (to appear)
3. "Complete bipartite graphs whose topological symmetry groups are polyhedral," 2011, available at *arXiv:1106*, to appear in *Tokyo J. Math*
4. "Classification of topological symmetry groups of  $K_n$ ," with E. Flapan, R. Naimi, and M. Yoshizawa, *Topology Proceedings*, vol. 43, 2014, pp. 209-233
5. "Counting Links and Knots in Complete Graphs," with L. Abrams and L. Trott, *Tokyo J. Math*, vol. 36, no. 2, 2012, pp. 429-458
6. "Using tiling theory to generate angle weaves with beads," with G. Fisher, *Journal of Mathematics and the Arts*, vol. 6, no. 4, 2012, pp. 141-158
7. "Spatial Graphs with Local Knots," with E. Flapan and R. Naimi, *Revista Matemática Complutense*, vol. 25, no. 1, 2012, pp. 493-510 (DOI: 10.1007/s13163-011-0072-9)
8. "Student Surveys: What Do They Think?" with H. Zullo, K. Cline, et. al., in *Teaching Mathematics with Classroom Voting: With and Without Clickers*, ed. K. Cline and H. Zullo, Mathematical Association of America, 2011
9. "Complete graphs whose topological symmetry groups are polyhedral," with E. Flapan and R. Naimi, *Algebraic Geometric Topology*, vol. 11, 2011, pp. 1405-1433
10. "Drawing a triangle on the Thurston model of hyperbolic space," with C. Bennett and P. Shanahan, *Math. Mag.*, vol. 83, 2010, pp. 83-99
11. "Counting Links in Complete Graphs," with T. Fleming, *Osaka J. Math.*, vol. 46, 2009, pp. 1-29
12. "Intrinsic linking and knotting are arbitrarily complex," with E. Flapan and R. Naimi, *Fundamenta Mathematicae*, vol. 201, no. 2, 2008, pp. 131-148
13. "Tree Diagrams for String Links II: Determining Chord Diagrams," *J. Knot Theory Ramif.*, vol. 17, no. 6, 2008, pp. 649-664
14. "Weight Systems for Milnor Invariants," *J. Knot Theory Ramif.*, vol. 17, no. 2, 2008, pp. 213-230
15. "Virtual Spatial Graphs," with T. Fleming, *Kobe J. Math.*, vol. 24, no. 2, 2007, pp. 67-85
16. "An Introduction to Virtual Spatial Graph Theory," with T. Fleming, in *Proceedings of the International Workshop on Virtual Knot Theory*, 2007, pp. 1-10

on *Knot Theory for Scientific Objects*, OCAMI Studies, Vol. 1 (A. Kawauchi, editor), Osaka Municipal University Press, 2007

17. "Three dimensional finite point groups and the symmetries of beaded beads," with G. Fisher, *Journal of Mathematics and the Arts*, vol. 1, no. 2, 2007, pp. 85-96
18. "Intrinsic Linking and Knotting in Virtual Spatial Graphs," with T. Fleming, *Algebr. Geom. Topol.*, vol. 7, 2007, pp. 583-601
19. "Tree Diagrams for String Links," *J. Knot Theory Ramif.*, vol. 15, no. 10, 2006, pp. 1303-1318
20. "Intrinsic linking and knotting of graphs in arbitrary 3-manifolds," with E. Flapan, H. Howards and D. Lawrence, *Algebr. Geom. Topol.*, vol. 6, 2006, pp. 1025-1035
21. "Intersection Graphs for String Links," *J. Knot Theory Ramif.*, vol. 15, no. 1, 2006, pp. 53-72
22. "On the Topology of Celtic Knot Designs," with G. Fisher, *Proceedings of the 7<sup>th</sup> Annual BRIDGES Conference* 2004 (also in *Visual Mathematics*, vol. 7, no. 1, 2005)
23. "A few weight systems arising from intersection graphs," *Michigan Math. J.*, vol. 51, no. 3, 2003, pp. 509-536
24. "A geometric interpretation of Milnor's triple invariants," with P. Melvin, *Algebr. Geom. Topol.*, vol. 3, 2003, pp. 557-568
25. "On the existence of finite type link homotopy invariants," with D. Thurston, *J. Knot Theory Ramif.*, vol. 10, no. 6, 2001, pp. 1025-1040
26. "Finite Type Link Homotopy Invariants II: Milnor's invariants," *J. Knot Theory Ramif.*, vol. 9, no. 6, 2000, pp. 758-778
27. "Finite Type Link Concordance Invariants," *J. Knot Theory Ramif.*, vol. 9, no. 3, 2000, pp. 367-385
28. "The Intersection Graph Conjecture for Loop Diagrams," *J. Knot Theory Ramif.*, vol. 9, no. 2, 2000, pp. 187-211
29. "Finite Type Link Homotopy Invariants," *J. Knot Theory Ramif.*, vol. 8, no. 6, 1999, pp. 773-787

### Other Papers and Articles

1. Review of *Viewpoints: Mathematical Perspective and Fractal Geometry in Art*, by Marc Frantz and Annalisa Crannell, *Journal of Mathematics and the Arts*, vol. 5, no. 4, 2011, pp. 221-222
2. "The Exhibition of Mathematical Art at the 2008 Joint Mathematics Meetings," *Journal of Mathematics and the Arts*, vol. 2, no. 1, 2008, pp. 39-45

### Preprints

1. "The forbidden number of a knot," with A. Crans and S. Ganzell, 2013, available at [arXiv:1305.5200](https://arxiv.org/abs/1305.5200), in submission
2. "Chord Diagrams and Gauss Codes for Graphs," with T. Fleming, 2006, available at [arXiv:math.CO/0508269](https://arxiv.org/abs/math/0508269)

### Work in Progress

1. "Topological symmetry groups of complete bipartite graphs," with M. Pittluck and K. Hake
2. "Coloring spatial graphs," with T. Kong and A. Lewald
3. "The Alexander polynomial for virtual twist knots," with I. Benioff

### Grants and Awards

LMU Course Development Grant, 2013

LMU Academic Technology Grant, 2012

Carl B. Allendoerfer Award, Mathematical Association of America, 2011

Recognizes articles of expository excellence published in *Mathematics Magazine*. Awarded for "Drawing a triangle on the Thurston model of hyperbolic space," with C. Bennett and P. Shanahan.

NSF Grant DMS-0905687, 2009-2012, PI, \$164,293

"Topological symmetries and intrinsic properties of graphs embedded in 3-space"

LMU Continuing Faculty Grant, 2009

LMU Continuing Faculty Grant, 2007

LMU Center for Teaching Excellence Faculty Development Grant, 2005

CASTL Institute Scholar, 2005

LMU Summer Research Grant, 2004

LMU Summer Research Grant, 2003

NSF Grant DUE-0088211, 2001-2004, Co-PI, \$187,054

“Discovery Based Science and Math in an Environmental Context”  
Florida Atlantic University Research Initiation Award, #RIA-19, 2000  
Project NExT Fellow, 1999-2000  
Department of Education National Needs Fellowship, 1993-1994

### Conference Presentations and Panels and Seminar/Colloquium Talks

1. “Coloring Spatial Graphs,” International Workshop on Spatial Graphs 2013, Tokyo Christian Women’s University, Tokyo, Japan, August 14, 2013
2. “Coloring Spatial Graphs,” Spatial Graphs Conference, Loyola Marymount University, June 9, 2013
3. “Flipping Precalculus,” Teaching with Technology Day, Loyola Marymount University, January 18, 2013
4. “Intrinsic Properties of Spatial Graphs,” The Undergraduate Knot Theory Conference, Denison University, July 2012 (Invited Talk)
5. “Topological Symmetry Groups of Complete Graphs,” Joint Mathematics Meetings, Boston, January 4, 2012
6. “Topological Symmetry Groups of Complete Graphs,” USC Mathematics Colloquium, January 19, 2011 (Invited Talk)
7. “Topological Symmetry Groups of Complete Graphs,” International Workshop on Spatial Graphs 2010, Waseda University, Tokyo, August 17-21, 2010
8. “Intrinsic linking and knotting are arbitrarily complex,” 1039<sup>th</sup> meeting of the AMS, Claremont McKenna College, May 4-5, 2008 (Invited Talk)
9. “How Does a Course in the Mathematics of Symmetry Affect Students in the Liberal Arts?,” MAA MathFest, San Jose, August 2007
10. “Mathematics of Symmetry, an Experimental Core Mathematics Course,” BIRS Workshop on Innovations in Mathematics Education via the Arts, Banff, Canada, January 22, 2007
11. “Multiple Facets of Quantitative Literacy,” International Society for the Scholarship of Teaching and Learning, November 9, 2006 (panel presentation with Jacqueline Dewar, Curtis Bennett, Suzanne Larson and Thomas Zachariah)
12. “Mathematics of Symmetry, an Experimental Core Mathematics Course,” LMU Center for Teaching Excellence, October 26, 2006
13. “Intrinsic linking and knotting in virtual spatial graphs,” USC Geometry and Topology Seminar, April 17, 2006 (Invited Talk)
14. “Intrinsically linked and knotted graphs,” Claremont Mathematics Colloquium, February 22, 2006 (Invited Talk)
15. “Weight systems for Milnor invariants,” Joint Mathematics Meetings, San Antonio, January 11-15, 2006
16. “Intrinsic Linking and Knotting in Virtual Spatial Graphs,” Claremont Topology Seminar, November 29, 2005 (Invited Talk)
17. “Surviving the First Few Years in an Academic Job,” Panel discussion, Southern California section meeting of MAA, October 8, 2005 (Invited Participant)
18. “Effects of Core Classes on Attitudes and Beliefs towards Mathematics,” CASTL Institute, Columbia College, Chicago, June 9-11, 2005 (Institute Scholar)
19. “Knots and Graphs,” Guest Lecture at UCLA, February 2005
20. “Knots and Graphs,” LMU Math Dept. Seminar, February 2005
21. “On the Topology of Celtic Knot Designs,” 7<sup>th</sup> Annual BRIDGES Conference, Southwestern College, Winfield, KS, July 30-August 1, 2004 (with Gwen Fisher, Cal Poly San Luis Obispo)
22. “An Overview of Robertson-Seymour-Thomas,” International Workshop on Knots and Links in a Spatial Graph, Waseda University, Tokyo, July 20-28, 2004
23. “Collaborative Learning in Calculus I,” PMET Workshop, SUNY Oswego, NY, June 2004
24. “The Topology of Celtic Knot Designs,” MAA Session on Math and the Arts, Joint Mathematics Meetings, Phoenix, January 7-10, 2004 (with Gwen Fisher, Cal Poly San Luis Obispo)
25. “Discovery-based Science and Mathematics in an Environmental Context,” MAA Poster Session on Projects supported by the NSF DUE, Joint Mathematics Meetings, Phoenix, January 7-10, 2004 (with Stephanie Fitcher, Honors College, Florida Atlantic University)
26. “Intersection Graphs for String Links,” 991<sup>st</sup> meeting of the AMS, University of North Carolina, Chapel Hill, October 24-25, 2003 (Invited Talk)
27. “Discovery-based Science and Mathematics in an Environmental Context,” MAA Poster Session on Projects

- supported by the NSF DUE, Joint Mathematics Meetings, Baltimore, January 17, 2003 (with Stephanie Fitcher, Honors College, Florida Atlantic University)
28. "To Have or Have Knot," Mathematics Colloquium, California Polytechnic University, San Luis Obispo, November 8, 2002 (Invited Talk)
  29. "Finite type invariants and intersection graphs," Claremont Colleges Topology Seminar, October 29, 2002 (Invited Talk)
  30. "Seifert Surfaces and Milnor's Invariants," 965<sup>th</sup> meeting of the AMS, UNLV, Las Vegas, April 21-22, 2001 (Invited Talk)
  31. "On the existence of finite type link homotopy invariants," Joint Mathematics Meetings, New Orleans, January 13, 2001
  32. "A geometric interpretation of  $\bar{\mu}_{gr}$ ," 959<sup>th</sup> meeting of the AMS, Columbia University, New York, November 3, 2000
  33. "Three weight systems arising from intersection graphs," AMS Mathematical Challenges of the 21<sup>st</sup> Century, UCLA, August 7-12, 2000
  34. "Topological Psychology," MAA Mathfest, UCLA, August 3-5, 2000
  35. "Intersection graphs and finite type invariants," Workshop on Low-Dimensional Topology, University of Warwick (UK), July 10-21, 2000
  36. "Finite Type Link Homotopy Invariants," 949<sup>th</sup> meeting of the AMS, UNC Charlotte, October 15-17, 1999

### Conferences Organized

1. International Workshop on Spatial Graphs 2013, Tokyo Christian Women's University, Tokyo, Japan, August 2013 (Co-organizer)
2. Conference on Spatial Graphs, Loyola Marymount University, June 2013 (Co-organizer)
3. International Workshop on Spatial Graphs 2010, Waseda University, Tokyo, Japan, August 2010 (Co-organizer)
4. Southern California Student Conference on Spatial Graphs, Caltech, April 2009 (Co-organizer)
5. Building a Community Partnership: Collaborations in Environmental Science, Education and Conservation, Honors College, FAU, Jupiter, FL, July 2001 (Co-organizer)

### Conference Sessions Organized

1. "Linking Mathematics with Other Disciplines," MAA Session, Joint Mathematics Meetings, Baltimore, January 2003 (Co-organizer)
2. Panel on "Strategies for Mathematics for Liberal Arts," Project NExT, UCLA, August 3, 2000

### Other Conferences and Workshops Attended

1. Joint Mathematics Meetings, San Diego, CA, January 2013
2. Joint Mathematics Meetings, San Francisco, CA, January 2010
3. Joint Mathematics Meetings, San Diego, CA, January 2008
4. Park City Mathematics Institute, Park City, UT, June 2006
5. MAA PMET workshop, Asilomar, CA, June 2006
6. Southern California Topology Conference, Caltech, May 2004
7. ISAMA-BRIDGES, Granada, Spain, July 23-26 2003
8. MAA PMET workshop, SUNY Potsdam, June 8-19 2003
9. Southern California Topology Conference, Caltech, May 2003
10. Joint Mathematics Meetings, San Diego, January 2002
11. Project Intermath Curriculum Workshop, Carroll College, Helena, MT, June 2001
12. Georgia International Topology Conference, University of Georgia, Athens, GA, May 2001
13. 31<sup>st</sup> Southeastern International Conference on Combinatorics, Graph Theory and Computing, Florida Atlantic University, March 2000
14. Joint AMS/MAA/SIAM Meeting, Washington, D.C., January 2000
15. MAA Mathfest, Providence, R.I., July 1999
16. Joint AMS/MAA/SIAM Meeting, San Antonio, TX, January 1999
17. Kirbyfest, MSRI, UC Berkeley, June 1998

## Teaching Experience

### Theses Directed

Kate Hake, "Topological Symmetry Groups of Complete Bipartite Graphs," Senior Thesis, May 2012

Katrina Freitag, "Cycling through Crystals: A Spatial Analysis of Human Body Movement," Senior Thesis, May 2012

Lowell Trott, "Gordian: A Mathematical Tool for Spatial Graph Characterization," Senior Thesis, May 2008

Katie Williams, "Constructivist Perspectives on Problem Solving," MAT Thesis, July 2006

### Loyola Marymount University

Math 102 Quantitative Skills for the Modern World (Fall 2005; Fall 2008)

Math 112 Math Analysis for Business II (Spring 2004; Spring 2005)

Math 120 Precalculus (Fall 2008; Fall 2010; Fall 2011; Fall 2012; Spring 2013)

Math 131 Calculus I (Fall 2002; Fall, 2003; Fall 2006)

Math 198 Mathematics of Symmetry (Spring 2006; Spring 2010; Spring 2013)

Math 234 Multivariable Calculus (Spring 2008; Fall 2013)

Math 245 Differential Equations (Spring 2003)

Math 248 Introduction to Proofs (Spring 2004; Fall 2007)

Math 250 Linear Algebra (Spring 2005; Spring 2006; Spring 2012; Spring 2014)

Math 285 Discrete Mathematics for Engineering (Spring 2007)

Math 302 Mathematical Ideas for Future Teachers II (Spring 2005; Spring 2006)

Math 321 Real Analysis (Fall 2010; Fall 2011)

Math 366 Discrete Methods (Spring 2003; Spring 2012)

Math 397 Putnam Preparation (co-taught) (Fall 2002-2012)

Math 471 Topology (Spring 2007; Spring 2011)

Math 473 Differential Geometry (Fall 2003; Fall 2005)

Math 493 Senior Capstone for Future Teachers (Fall 2005; Fall 2006; Fall 2013)

Math 550 Fundamental Concepts of Geometry (Fall 2007; Fall 2009; Fall 2012)

Math 598 Transformational Geometry (Spring 2014)

### Honors College, Florida Atlantic University

Symmetry (Spring, 2002)

Statistics (Fall, 2001)

Precalculus (Fall, 2000; Fall, 2001)

Calculus I (Spring, 2000; Spring, 2001)

Calculus II (Fall, 2000; Spring, 2002)

Calculus II for Physics (Spring, 2001)

Matrix Theory (Fall, 1999)

Discrete Mathematics (Spring, 2001)

Mathematical Reasoning (Spring, 2000; independent study)

Topology and Psychology (Spring, 2000; co-taught with Kevin Lanning)

Introduction to Programming in C (Fall, 1999)

Scientific Writing (Fall, 1999)

### University of California, Berkeley

Multivariable Calculus (Summer 1997)

Co-Instructor for undergraduate seminar on low-dimensional topology (Spring 1997)

Teaching Assistant for Calculus, Linear Algebra, Discrete Mathematics, Differentiable Manifolds (graduate course)

## Professional Service

Graded AP Calculus Exams, 2008

Referee for *Topology*, *J. Knot Theory Ramif.*, *Illinois J. Math.*, *Proc. AMS*, *Europ. J. Comb.*, *Am. Math. Monthly*, *J. Math. Arts*, *J. Math. Chemistry*, *Disc. & Comp. Geom.*, *Discrete Mathematics*

Proposal reviewer for the National Science Foundation

Reviewer for Mathematical Reviews

## **University Service: Loyola Marymount University**

### **University Service**

Core Curriculum Committee, 2006-present

- Chair 2009-2011, 2013-present
- Chair of Quantitative Reasoning Course Criteria Working Group (2011-2012)
- Chair of Foundations Course Approval Subcommittee (2012-present)
- Member of Core Curriculum Steering Group (2012-2013)

Trustee Committee (Student Life), 2008-2011

University Teacher Education Committee, 2008-present

MaSTeP Committee, 2006-present

Faculty Senate, 2005-2008

Academic Leadership Workshop Planning Committee, 2007

Organizer of Junior Faculty Seminar (aka Cub Club), 2004-2007

Valedictorian Committee, 2002-2006

### **College Service**

Seaver College Third-Year Review Committee (2012-present)

Seaver College representative to Advisory Board for Undergraduate Teacher Preparation Program, 2008-present

Science and Engineering Community Outreach Program (SECOP), 2007 and 2008

### **Department Service**

Secondary Teacher Preparation Program Director for Mathematics, 2007-present

Math Dept. Teacher Education Committee (Chair), 2005-present; Chair 2005-2011, 2012-present

Putnam Team Advisor, 2002-present

Math Dept. Education Liaison Committee, 2005

Math Dept. Curriculum Committee, 2002-2004, 2005-2007, 2007-2008 (chair)

### **Advising Student Groups**

Faculty Advisor for LMU Mixed Martial Arts Club, 2012-present

Faculty Advisor for LMU Swing and Ballroom Club, 2004-2006

Math Club Advisor, 2002-2005

## **University Service: Honors College, Florida Atlantic University**

Bylaws Committee (Chair), 2001-2002

Presiding Officer, Honors College Faculty Assembly, 2000-01

Screening Committee for Undergraduate Teaching Award (Chair), 2000-01

FAU Committee for Undergraduate Teaching Award, 2000-01

Faculty Committee (Chair), Fall 1999

Admissions Committee (Chair), 1999-2000

Promotions and Tenure Guidelines Committee, 1999-2002

Academic Affairs and Student Life Committee, 1999-2001

Search Committee for Mathematics, 1999-2000 (Chair), 2000-01

Search Committee for Physics (Chair), 1999-2000

Search Committee for French, 1999-2000

FAU Faculty Council (alternate), 1999-2000

## **Community Service**

Assisted with 8<sup>th</sup> grade Science Fair projects at Whaley Middle School, Compton, January-February 2005

**Languages:** French, German.

**Computer Languages:** BASIC, Pascal, LISP, C, C++, Java, Unix

**Professional Memberships**

American Mathematical Society

Mathematical Association of America

National Council of Teachers of Mathematics

Last Updated: 3/3/14