Michael G. Sullivan

Education

1999	Ph.D. (Mathematics)	Stanford University
1996	M.S. (Mathematics)	Stanford University
1994	B.A. (Mathematics)	Princeton University

Professional Experience

2009 - Present	Associate Professor, Dept. of Mathematics and Statistics, Univ. of Massachusetts, Amherst
Spring 2010	Research Member, Mathematical Sciences Research Institute, Berkeley
2003 - 2009	Assistant Professor, Dept. of Mathematics and Statistics, Univ. of Massachusetts, Amherst
2003 - 2004	Postdoctoral Fellow, Mathematical Sciences Research Institute, Berkeley
2000 - 2003	NSF VIGRE Visiting Assistant Professor, Dept. of Mathematics, Univ. of Michigan, Ann Arbor
Summer 2000	Visitor, Swiss Federal Institute of Technology, Zurich
1999 - 2000	Research Member, Institute for Advanced Study, Princeton
Summer 1996	Summer Associate, Goldman Sachs Co., New York

Grants

- 2014-2019, $35,000, Simons Foundation "Holomorphic curves and contact geometry" (Sole Principal Investigator

- 2010-2013, $112,036, NSF-DMS 1007260 (Sole Principal Investigator)

- 2010-2011 $22,436, Mass Mutual Foundation "The Actuarial Connection" (Principal Investigator) (To develop an actuarial concentration and related classes)

- 2009-2010 $21,374 ,Mass Mutual Foundation "The Actuarial Connection" (Principal Investigator) (To develop an actuarial concentration and related classes)

- 2008-2011, $1,500,000, NSF-DMS 0757245, 0757253, 0757312, 0757293, 0757277, "How the algebraic topology of closed manifolds relates to strings and 2D quantum field theory" (Participant in collaborative FRG grant)

- 2007-2010, $97,149, NSF-DMS 0707091, "Contact homology and string topology" (Sole Principal Investigator)

- 2003-2006, $84,128, NSF-DMS 0305825/0450115, "Computations and applications of periodic Floer homology and contact homology in symplectic geometry" (Sole Principal Investigator)

- Summer 2005, $3,000, NSF-DMS 0542290 (for REU student)

- 2000-2003, $N/A, NSF-DMS 9977371 (VIGRE Postdoc)

Papers

1. "K-theoretic invariants for Floer homology," Geometric and Functional Analysis 12 (2002) 810-872.

2. "Modeling and hedging options under stochastic pricing parameters," preprint (2003) 15 pages (with J. Keppo, X. Meng, S. Shive).

3. "Orientations in Legendrian contact homology and exact Lagrangian immersions," International Journal of Mathematics 16 (2005) 453-532 (with T. Ekholm, J. Etnyre).

4. "The periodic Floer homology of a Dehn twist," Algebraic and Geometric and Topology 5 (2005) 301-354 (with M. Hutchings).

5. "Non-isotopic Legendrian submanifolds in R^{2n+1}," Journal of Differential Geometry 71 (2005) 85-128 (with T. Ekholm, J. Etnyre).

6. "The contact homology of Legendrian submanifolds in R^{2n+1}," Journal of Differential Geometry 71 (2005) 177-305 (with T. Ekholm, J. Etnyre).

7. "Convergence to Black-Scholes for ergodic volatility models," European Journal of Applied Mathematics 16 (2005) 385-409 (with J. Conlon).

8. "Rounding corners of polygons and the embedded contact homology of T^3," Geometry and Topology 10 (2006) 169-266 (with M. Hutchings).

9. "Legendrian contact homology for $P \times R$," Transactions of the AMS, 359 (2007), 3301-3335 (with T. Ekholm, J. Etnyre).

10. "A computational scheme for the optimal strategy in an incomplete market," Journal of Economic Dynamics and Control, 31 (2007) 3591-3613 (with J. Keppo, X. Meng).

11. "Symplectic field theory and quantum backgrounds," Journal of Symplectic Geometry 6 (2008), no. 4, 379-405 (with J. Terilla and T. Tradler).

12. "Knot contact homology," Geometry and Topology 17 (2013), no. 2, 975-1112 (with T. Ekholm, J. Etnyre, L. Ng).

13. "Filtrations on the knot contact homology of transverse knots," Mathematische Annalen 355 (2013), no. 4, 1561-1591 (with T. Ekholm, J. Etnyre, L. Ng).

14. "A bordered Legendrian contact algebra," Journal of Symplectic Geometry 12 (2014), no. 2, 237-255 (with A./J. Harper).

15. "Transverse open string topology and the cord algebra" Journal of Symplectic Geometry 13 (2015), no. 1, 1-16 (with S. Basu, J. McGibbon, D. Sullivan).

16. "Families of Legendrian submanifolds via generating families" 30 pp. To appear in Quantum Topology (with J. Sabloff).

17. "Cellular Legendrian contact homology for surfaces I," 45 pp. Submitted (with D. Rutherford).

18. "Cellular Legendrian contact homology for surfaces II," 155 pp. Submitted (with D. Rutherford).

19. "An energy-capacity inequality for Legendrian submanifolds, " 75 pp. Submitted (with G. Dimitroglou Rizzell).

20. "Generating families and $\mathbb{Z}_2$-augmentations for Legendrian surfaces," approximately 20 pp. In preparation (with D. Rutherford).

21. "A multi-dimensional transform for pricing American options under Levy models with stochastic volatility," working title, approximately 90 pp double spaced. In preparation (with N. Beliava, Y. Chen, S. Nawalka, S. Zreik).

22. "Transverse open string topology and knot complements," In preparation (with D. Sullivan).

Teaching

- Created and taught new undergraduate actuarial course Math 437 (formerly 497FM).

- Co-authored with E. Sommers the (unique) textbook for introductory undergraduate math finance course Math 537 (formerly 441).

- Created and taught intermediate math finance course Math 497G.

- Responsible for course content shift of first-year topology to include algebraic topology.

- Developing new actuarial math concentration in conjunction with various Undergraduate Program Directors.

- Course Chair for multi-section 3rd semester calculus, Math 233 Fall 2007 and part of 1st semester calculus Math 127 Fall 2015.

- Taught grad topics courses in symplectic geometry and financial math.

- Other courses taught at UMass (usually 3 semester-long classes per year): Calculus 1; Advanced Linear Algebra; Topology; Algebraic Topology.

Synergistic Activities

- "UMass Geometry and Topology Seminar" founder and organizer/co-organizer, Fall 05 - present (except 3 semesters when not on campus).

- Organized and co-organized various other formal and informal seminars, Fall 00 - Fall 01, Summer 02 - Fall 03, Fall 04-Spring 05.

- Directed frequent graduate reading classes in symplectic geometry, low-dimensional topology, and finance.

- Co-organized: AMS Eastern Section Meeting, Special Session in Symplectic Topology, 4/06; AIM (American Institute of Mathematics) Conference in Symplectic Topology, 9/07; Banff Conference in Low-Dimensional Topology 3/14; Georgia Topology Conference 5/16.

- Expository seminars for high school, undergraduate and graduate students.

- Founder and co-organizer of a bi-semester outreach seminar to Holyoke Community College Fall 2013-present.

Mentoring

- PhD students: Jason McGibbon (graduated 2011), Sami Zreik, Mark Lowell.

- REU students: Susan Saw (summer 2005), Peter Salemi (summer 2008), Alicia Harper (summer 2011), Shuang Xu (summer 2014).

- Undergraduate Honors Thesis: Jamie Leehy (2005-2006), Shuang Xu (2014-2015).

- Postdoctoral Fellows: Hao Wu (2004-2007, now Associate Professor at George Washington University), Yakov Savelyev (2007-2010, now Associate Professor at University of Colima, Mexico).

Service (selected)

- Associate Head 2014-2016

- Actuarial program director 2005-2014, 2016-present Co-developed undergraduate actuarial program at University of Massachusetts, including concentration, undergraduate club, exam courses, career fairs. Raised funds from companies and alumni, sometimes in conjunction with development office.

- Faculty search committee 2006-2008, 2012-2013 (Chair), 2014-2015

- Department personnel committee 2009-2011

- Graduate TA orientation (Chair) 2013-2014

- Department Head Search 2014

- Departmental representative for NEAGEP (inter-university program to promote diversity in science) 2005-2008.

- NSF panel Fall 2014.

- Referee for Applied Probability, Geometry and Topology, Geometric and Functional Analysis, Algebraic and Geometric Topology, Journal of Symplectic Geometry, Knot theory and its Ramifications, International Research Notices in Mathematics, Quantum Topology, Topology and Its Applications, Inventiones, Annals in Mathematics, and others.

Talks

Dynamical Systems Seminar, Boston University, 1/99

Topology/Geometry Seminar, UC Davis, 1/99

Topology/Geometry Seminar, UC Irvine, 1/99

Thesis Defense, Stanford University, 8/99

IAS Members Seminar, IAS, 11/99

Symplectic Topology Conference, ETH Zurich, 12/99

Topology/Geometry Seminar, University of Pennsylvania, 3/00

Topology/Geometry Seminar, University of Basel, Switzerland, 7/00

Symplectic Geometry Seminar, ETH Zurich, 7/00

Topology Seminar, University of Michigan, 10/00

Topology Seminar, Michigan State University, 10/00

Symplectic Geometry Seminar, University of Michigan, 4/01

Topology/Geometry Seminar, CRM, Montreal, 5/01

AMS Midwestern Sectional Meeting, Special Session in Financial Math, 3/02

Geometry Seminar, University of Michigan, 3/02

Geometry Seminar, Brown University, 4/02

Geometry Seminar, University of Michigan, 10/02

Bay Area Topology Seminar, UC Berkeley, 10/02

Topology Seminar, Wayne State University, 10/02

Topology/Geometry Seminar, University of Wisconsin, 12/02

Differential Geometry Seminar, MIT, 12/02

Financial Math Seminar, University of Michigan, 1/03

Colloquium, University of Rochester, 1/03

Financial Math Seminar, UC Davis, 1or2/03

Colloquium, UC Davis, 1or2/03

Colloquium, University of Massachussetts, 2/03

Colloquium, NC State, 2/03

Colloquium, Florida State, 2/03

FSU-UF Topology Conference, Florida State, 2/03

Colloquium, University of Waterloo, 2/03

AMS Eastern Sectional Meeting, Special Session in Symplectic Geometry, 4/03

Topology Seminar, Johns Hopkins, 9/03

Geometry Seminar, MSRI, 10/03

Postdoc Seminar, MSRI, 10/03

Symplectic Geometry Seminar, UC Berkeley, 11/03

Banff "Hot Topics" Workshop, BIRS, 11/03

Symplectic Geometry Seminar, Stanford University, 1/04

AMS Western Sectional Meeting, Special Session in Symplectic Geometry, 4/04

Colloquium, University of Massachusetts, 10/05

Tri-college Contact Topology Seminar, Bryn Mawr, 12/05

Geometry Seminar, University of Connecticut, 4/06

Conference, CUNY Graduate Center, 4/06

Colloquium, University of Western Ontario, 11/06

Differential Geometry Seminar, MIT, 11/06

Geometry Conference, Lehigh, 3/07

Postnikov Memorial Topology Conference, Polish Institute of Mathematics, Bedlewo, Poland, 6/07.

AMS Special Session in Symplectic Geometry, Worcester, MA, 4/08

Quantum Field Theory Conference, Berkeley, 1/09

Knot Theory Conference (plenary speaker), George Washington University 1/09

Geometry Conference, Simons Center, 5/11

Geometry and Topology Seminar, Stony Brook, 9/11

AMS Special Session in Symplectic Geometry, Cornell, 9/11

Topology Seminar, MIT, 10/11

Topology Conference, University of Georgia, 5/12

Topology and Dynamics Conference, Central Connecticut State University, 4/13

Contact Geometry Conference, Royal Academy of Sciences, Brussels, 8/13

Quantum Seminar, Institute of Basic Sciences, Pohang, Korea, 6/14

Colloquium, Institute of Basic Sciences, Pohang, Korea, 6/14

Topology Seminar, Stony Brook, 8/15

Topology Seminar, MIT, 10/15

Seminar, Mittag-Leffler Institute, Sweden, 10/15

Colloquium, Ball State University, Indiana, 3/16

Topology Seminar, Princeton University, 3/16