Michael G. Sullivan

Personal information

Born: 1972, Boston, MA, USA. US Citizenship.

Education

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

Professional Experience

2018-present	Full Professor, Dept. of Mathematics and Statistics, Univ. of Massachusetts, Amherst
Fall 2018	CRM-Simons Professor, Centre de Recherches Mathematiques, Montreal, Canada
2009 - 2018	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

Grants

- 2020-2025, $42,000, Simons Foundation "The success and failure of holomorphic curves and Legendrian submanifolds" (Sole Principal Investigator)

- 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

Geometry and Topology

- "Sheaves via augmentations of Legendrian surfaces." to appear in J. Hom. Rel. Struct, 37 pages (with D. Rutherford).

- "The persistence of the Chekanov-Eliashberg algebra." Selecta Math. (N.S.) 26 (2020), no. 5, Paper No. 69, 32 pp. (with G. Dimitroglou Rizell)

- "An energy-capacity inequality for Legendrian submanifolds." J. Topol. Anal. 12 (2020), no. 3, 547–623. (with G. Dimitroglou Rizell)

- "Cellular Legendrian contact homology for surfaces, part I." Adv. Math. 374 (2020), 107348, 71 pp (with D. Rutherford)

- "Cellular Legendrian contact homology for surfaces, part II." Internat. J. Math. 30 (2019), no. 7, 1950036, 135 pp. (with D. Rutherford)

- "Cellular Legendrian contact homology for surfaces, part III." Internat. J. Math. 30 (2019), no. 7, 1950037, 111 pp. (with D. Rutherford)

- "Generating families and augmentations for Legendrian surfaces." Algebr. Geom. Topol. 18 (2018), no. 3, 1675–1731 (with D. Rutherford)

- "Families of Legendrian submanifolds via generating families." Quantum Topol. 7 (2016), no. 4, 639–668. (with J. Sabloff)

- "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).

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

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

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

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

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

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

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

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

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

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

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

Financial Math

- "A multi-dimensional transform for pricing American options under Levy models with stochastic volatility,"50pp. (with N. Beliava, Y. Chen, S. Nawalka, S. Zreik).

- "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).

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

Recent Service (selected)

- Associate Head 2014-2016

- Actuarial program director 2005-2014, 2016-2017 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, 2016-2017

- Department personnel committee 2009-2010, 2010-2011, 2017-2018, 2019-2020 (Chair), 2020-2021

- Graduate TA orientation (Chair) 2013-2014

- Department Head Search 2014

- Space committee 2014-present

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

- NSF panel 2014, 2018.

- 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, Journal of the AMS, Eletronic Research Notices, and others.

Courses taught at UMass

- Pure Math: Math 671 (Topology), Math 672 (Algebraic Topology), Math 703 (Manifolds), Math 797SG (Symplectic Geometric and Floer Theory), Math 545 (Advanced Linear Algebra).

- Applied Math: Math 551 (Scientific Computing), Math 537 (Financial Math), Math 497G (Financial Math 2), Math 437 (Actuarial Financial Math), Stats 515 (Probability with calculus), Math 456 (Math modeling, IE course), Math 697FM (Graduate Financial Engineering).

- Statistics: Stats 516 (Statistics with calculus), Stats 525 (Linear regressions, IE course).

- Intro-level: Math 127 (Calculus 1 for life science, large lecture), Math 131 (Calculus 1), Math 233 (Calculus 3)

Teaching-related activities at UMass

- Created WebWork (online) data bank of problems for 70% of Math 537 problems. Co-authored with E. Sommers the (free, unique) textbook for Math 537.

- Created and taught new undergraduate actuarial course Math 437 (formerly 497FM) which is now offered every year. Studied and passed the Actuarial FM Exam to do this

- Developed new actuarial math concentration in conjunction with various Undergraduate Program Directors. Director of Actuarial program for over 10 years since its inception in 2005. Founding Faculty Mentor for actuarial student club.

- Course Chair for the following multi-section classes: Math 233 (Fall 2007), part of Math 127 (Fall 2015), Stats 515 (Fall 2017).

- Learned Matlab for Math 551 and R for Stats 525.

- Directed frequent graduate reading classes in symplectic geometry, low-dimensional topology, and finance. This includes my PhD students and about 10 other students, while at UMass.

- Created and taught two grad courses (797SG, 697FM).

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

Mentoring at UMass

- PhD students: Jason McGibbon (2011), Sami Zreik (ABD 2012), Mark Lowell (2017), Oskar Bzoma (current), Yasim Karacan (current).

- 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), Cafei Fan (2020-2021).

- 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).

Synergistic Activities

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

- 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; Contact Geometry Workshop at CIRGET Montreal, 11/18.

- Expository seminars for high school, undergraduate and graduate students (past). Co-organizer of math fair at local highs with underrepresented minorities (current).

- Founder and co-organizer of a twice-a-semester outreach seminar to Holyoke Community College 2013-2018.

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

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

Geometry and Topology Seminar, Boston College, 2/17

Symplectic Geometry Seminar, University of Montreal, 7/17

Symplectic Geometric Conference (6 hours of talks), International Center for Theoretical Science in Bangalore, India, 12/17

Symplectic Geometry Seminar, University of Montreal, 8/18

Symplectic Geometry Seminar, University of Quebec at Montreal, 9/18

Symplectic Geometry and Representation Theory Conference, Centre de Recherches Mathematiques, Montreal, 6/19

Topology Seminar, MIT, 10/19

Western Hemisphere Symplectic Geometry Seminar, Online, 4/20