

# JOHN B. ETNYRE

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## Research Interests

*Geometric Topology:* knot theory, three and four manifold theory

*Differential Geometry:* symplectic and contact geometry

*Dynamical Systems:* fluid dynamics, non-holonomic dynamics

## Academic Degrees

UNIVERSITY OF TEXAS, AUSTIN, Ph.D., Mathematics Dec 1996  
Advisor: Robert E. Gompf

UNIVERSITY OF TEXAS, AUSTIN, B.S., May 1989  
with honors

## Awards, Grants and Honors

NSF CAREER Grant 2003-2008  
“Knot Theory and Dynamics in Contact Geometry”

NSF Focused Research Group Grant 2003-2006  
“Holomorphic Curves and Low Dimensional Topology”  
(Co-PI with Eliashberg, Hsiang, Hutchings, Mrowka, Ozsvath, Stern, Szabo)

*Invited one hour AMS Address,* April 2003  
Courant Institute, New York, NY.

National Science Foundation Grant 2002-2005  
“Knot Theory and Dynamics in Contact Geometry”  
(replaced with CAREER in 2003)

National Science Foundation Grant Fall 2000  
for contact geometry workshop (Co-PI with Eliashberg and Ceiliebak)

American Institute on Mathematics award Fall 2000  
for contact geometry workshop

National Science Foundation Post-doctoral Fellowship 1997-2001

Regents Endowed Graduate Fellowship August 1990

Phi Beta Kappa April 1989

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### Professional Positions Held

<i>Professor</i>	2008-present
Georgia Institute of Technology, Atlanta, Georgia	
<i>Associate Professor</i>	2005-2008
Georgia Institute of Technology, Atlanta, Georgia	
<i>Associate Professor</i>	2005-2006
University of Pennsylvania, Philadelphia, Pennsylvania	
<i>Visitor</i>	Winter 2005
University of California, Santa Barbara, California	
<i>Assistant Professor</i>	2001-2005
University of Pennsylvania, Philadelphia, Pennsylvania	
<i>Acting Assistant Professor/Visiting Instructor</i>	1997-2001
Stanford University, Stanford, California	
<i>Instructor</i>	Spring 1997
University of Texas, Austin, Texas	
<i>Research Assistant</i>	Spring 1992
Max Plank Institute, Bonn, Germany	
<i>Teaching Assistant and Assistant Instructor</i>	1989-96
University of Texas, Austin, Texas	

### Publications

1. *On contact surgery*, To Appear in Proc. Amer. Math. Soc.
2. *Contact structures on 3-manifolds are deformations of foliations*, To Appear in MRL.
3. *Invariants of contact structures from open books*, joint work with Burak Ozbagci, To Appear in Trans. Amer. Math. Soc.
4. *Open books and plumbings*, joint work with Burak Ozbagci, IMRN **2006** (2006), 1–17.
5. *Realizing 4-manifolds as achiral Lefschetz fibrations*, joint work with Terry Fuller, IMRN **2006** (2006), 1–21.
6. *Legendrian Contact Homology in  $P \times \mathbb{R}$* , joint work with Tobias Ekholm and Michael G. Sullivan, Trans. Amer. Math. Soc **359** (2007), 3301–3335.
7. *Contact Manifolds*, Encyclopedia of Mathematical Physics, eds. J.-P. Francoise, G.L. Naber and S.T. Tsou, Oxford: Elsevier, v. 1 (2006), 631–636.
8. *Invariants of Knots, Embeddings and Immersions via Contact Geometry*, joint work with Tobias Ekholm, Fields Inst. Commun **47** (2005), 77–96.

9. *Lectures on open book decompositions and contact structures*, Clay Math. Proc. 5 (the proceedings of the “Floer Homology, Gauge Theory, and Low Dimensional Topology Workshop”), (2006), 103–141.
  10. *Cabling and transverse simplicity*, joint work with Ko Honda, Annals of Math **162** (2005), 1305-1333.
  11. *Generic hydrodynamic instability of curl eigenfields*, joint work with Robert Ghrist, SIAM J. Appl. Dyn. Syst **4** (2005), no. 2, 377-390.
  12. *Orientations in Legendrian Contact Homology and Exact Lagrangian Immersions*, joint work with Tobias Ekholm and Michael G. Sullivan, IJM **16** (2005), no. 5, 453-532.
  13. *Legendrian and Transversal Knots*, in the Handbook of Knot Theory (Elsevier B. V., Amsterdam), (2005), 105-185.
  14. *The Contact Homology of Legendrian Submanifolds in  $\mathbb{R}^{2n+1}$* , joint work with Tobias Ekholm and Michael G. Sullivan, J. Differential Geom **71** (2005), no. 2, 177-305.
  15. *Non-isotopic Legendrian Submanifolds in  $\mathbb{R}^{2n+1}$* , joint work with Tobias Ekholm and Michael G. Sullivan, J. Differential Geom **71** (2005), no. 1, 85-128.
  16. *Planar open book decompositions and contact structures*, IMRN **2004** (2004), no. 79, 4255-4267.
  17. *On Symplectic Fillings*, Algebr. Geom. Topol **4** (2004), 73-80.
  18. *On connected sums and Legendrian knots*, joint work with Ko Honda, Adv. Math **179** (2003), 59-74.
  19. *Introductory Lectures on Contact Geometry*, Proc. Sympos. Pure Math **71** (2003), 81-107.
  20. *Problems in Low Dimensional Contact Topology*, joint work with Lenhard Ng, Proc. Sympos. Pure Math **71** (2003), 337-357.
  21. *Tight contact structures and Anosov flows*, joint work with Robert Ghrist, Topol. and its Appl **124** (2002), 211-219.
  22. *Invariants of Legendrian knots and coherent orientations*, joint work with Lenhard Ng and Joshua Sabloff, J. Sympl. Geom **1** (2002), no. 2, 321-368.
  23. *Contact topology and hydrodynamics II: solid tori*, joint work with Robert Ghrist, Ergod. Th. & Dynam. Sys **22** (2002), 819-833.
  24. *Tight contact structures with no symplectic fillings*, joint work with Ko Honda, Invent. Math **148** (2002), no. 3, 609-626.
  25. *On Symplectic Cobordisms*, joint work with Ko Honda, Math. Annalen **323** (2002), no. 1, 31-39.
  26. *Knots and contact geometry I: torus knots and the figure eight knot*, joint work with Ko Honda, J. Sympl. Geom **1** (2001), no. 1, 63-120.
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27. *An index for closed orbits in Beltrami fields*, joint work with Robert Ghrist, Phys. D **159** (2001), no. 3-4, 180-189.
28. *Erratum to: tight contact structures on lens spaces*, Commun. Contemp. Math **3** (2001), no. 4, 649-652.
29. *On the nonexistence of tight contact structures*, joint work with Ko Honda, Ann. of Math. (2) **153** (2001), no. 3, 749-766.
30. *Tight contact structures on lens spaces*, Commun. in Contemp. Math **2** (2000), no. 4, 559-577.
31. *Contact topology and hydrodynamics III: knotted orbits*, joint work with Robert Ghrist, Trans. Amer. Math. Soc **352** (2000), 5781-5794.
32. *Contact topology and hydrodynamics I: Beltrami fields and the Seifert Conjecture*, joint work with Robert Ghrist, Nonlinearity **13** (2000), 441-458.
33. *Stratified integrals and unknots in invicid flows*, joint work with Robert Ghrist, Contemp. Math **246** (1999), 99-111.
34. *Gradient flows within plane fields*, joint work with Robert Ghrist, Comm. Math. Helvetici **74** (1999), 507-529.
35. *Tight contact structures via dynamics*, joint work with Robert Ghrist, Proceedings of the AMS **127** (1999), 3697-3706.
36. *Transversal torus knots*, Geometry and Topology **3** (1999), 253-268.
37. *Symplectic convexity in low-dimensional topology*, Topol. and its Appl **88** (1998), 3-25.
38. *Smooth structures on collarable ends of 4-manifolds*, joint work with Zarko Bizaka, Topology **37** (1998), 461-467.
39. *Symplectic constructions on 4-manifolds*, Dissertation, University of Texas (December 1996), 1-92.

## Preprints

1. *A Duality Exact Sequence for Legendrian Contact Homology*, joint work with Tobias Ekholm and Joshua Sabloff, Preprint 2008.
  2. *Fibered Transverse Knots and the Bennequin Bound*, joint work with Jeremy Van Horn-Morris, Preprint 2008.
  3. *A note on Stein fillings of contact manifolds*, joint work with Anar Akhmedov, Thomas E. Mark and Ivan Smith, Preprint 2007.
  4. *Lectures on contact geometry in low-dimensional topology*, Preprint 2006.
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### Other Publications

1. Bulletin of the AMS Review: “Surgery on contact 3-manifolds and Stein surfaces”  
by Burak Ozbagci and András I. Stipsicz, Bull. Amer. Math. Soc. **43** (2006)  
429-434.

### Professional Service

#### *Board of Directors*

Mathematical Sciences Publishers 2007-

#### *Editor*

Algebraic and Geometric Topology (Principle Editor) 2007-  
Algebraic and Geometric Topology 2000-2007

#### *Panelist*

National Science Foundation Grant Panel 2004, 2006, 2007

#### *Workshop, Co-organizer*

*IAS Holomorphic Curves Workshop* May-June 2005  
Institute for Advanced Study.

*Four month workshop on Low Dimensional Contact Geometry* Fall 2000  
Stanford University and the American Mathematical Institute.

#### *Conferences, Co-organizer*

Interactions of geometry and topology in low dimensions, March 2007  
Banff International Research Station  
21st Annual Geometry Festival, University of Pennsylvania March 2006  
Holomorphic Curves, IAS Princeton June 2005  
Holomorphic Curves in Contact Geometry, AIM Palo Alto Aug. 2003  
Frontiers of PDEs and Dynamical Systems, Rutgers May 2003  
NSF Sections Meeting, NYC: Contact and Symplectic Geometry April 2003  
Symplectic and Contact Geometry, Stanford May 2001  
Low Dimensional Contact Geometry, Stanford December 2000

#### *Seminars, Organizer*

Analysis in Topology and Geometry (mini-course) Spring 2008  
Morse/Floer Theory (mini-course) Spring 2007  
Symplectic Geometry (mini-course) Fall 2006  
Kirby Calculus and 3-manifolds (mini-course) Summer 2005  
Heegaard-Floer Seminar (mini-course) Fall 2004  
Geometry and Topology Seminar 2003-2004  
Graduate Student Geometry Seminar 2001-2003  
Contact Geometry Seminar Fall 2000  
Sheaf Theory Seminar (mini-course) Summer 1994

*Seminars, Co-organizer*

Working Geometry-Topology Seminar	2006-2008
Topology-Geometry Seminar	2005-2008
Joint Emory-UGA-Ga Tech Topology Seminar	2005-2008
Colloquium	2005-2006
Symplectic Field Theory Seminar	Fall 2000
Low-dimensional Topology and Geometry Seminar	1999-00
Foliations, Fibrations and Slitherings Seminar	1998-99
Seminar on Some Results of Taubes and Kotschick	Summer 1995
Contact Geometry Seminar	Fall 1994

*Reviewer*

Math Reviews (about 80 do date), NSF Grant Proposals, Israel Science Foundation Grant Proposals, Netherlands Organization for Scientific Research Grand Proposals, Scientific and Technological Research Council of Turkey Proposals, National Research Foundation South Africa, and National Science Foundation, Georgia

*Referee*

Acta Mathematica Sinica, Algebraic and Geometric Topology, American Journal of Mathematics, Annals of Mathematics, Archiv der Mathematik, Asian Journal of Mathematics, Commentarii Mathematici Helvetic, Communications in Analysis and Geometry, Communications in Contemporary Mathematics, Differential Geometry and its Application, Duke Mathematics Journal, Expositiones Mathematicae, Geometriae Dedicata, Geometry and Topology, Houston Journal of Mathematics, International Journal of Mathematics and Mathematical Sciences, International Mathematics Research Notes, Journal of Differential Equations, Journal of Differential Geometry, Journal of Geometry and Physics, Journal of Knot Theory and its Ramifications, Journal of Symplectic Geometry, Journal of the London Mathematical Society, Journal of the Ramanujan Mathematical Society, Journal of Mathematical Sciences (the University of Tokyo), Mathematica Japonica, Mathematical Proceedings of the Cambridge Philosophical Society, Mathematical Research Letters, Michigan Journal of Mathematics, Nonlinearity, Pacific Journal of Mathematics, Proceedings of the AMS, Topology, Topology and its application, Transactions of the AMS, and various conference proceedings

*Committees*

Hiring Committee (Chair)	2007-09
Comprehensive Exam Committee: Algebra	2006-2007
Research Subcommittee for promotion of Mohammad Ghomi	2006
Junior Promotion and Tenure	2006-08
Computer Committee	2006-08
Research Subcommittee for reappointment of Igor Belagradek	2005
Colloquium Committee	2005-06
TA Training	2001-05
Math Major Advising	2001-05
Graduate Admissions	2002-03

Graduate Advising	2001-02
Masters Advising	2003-05

### Graduate Students

Adviser

Shea Vick Current (U. Penn)

Elena Bogdan (PhD U. Penn) Spring 2008

Stephan Schönenberger (PhD U. Penn) Summer 2005

Thesis: Planar open books and symplectic fillings.  
Placement: Winterthur Insurance, Zurich, Switzerland.

James Tripp (PhD U. Penn) Spring 2005

Thesis: Contact structures on open 3-manifolds.  
Placement: 4R Systems, Wayne PA.

*Defense Committee*

Michael Kettner (PhD, Georgia Institute of Technology) August 2007, Jeremy Van Horn-Morris (PhD, University of Texas) July 2007, Rafal Komendarczyk (PhD, Ga Tech) November 2005, Yongzhong Xu (PhD, Rutgers) April 2005, Madeeha Khalid (PhD, U Penn) May 2003, Joseph Lucas (Masters, U Penn) Apr. 2002.

*Oral Exam Committee (Ga Tech)*

2006: Michael Burkhart, Ian Palmer

*Oral Exam Committee (U Penn)*

2006: David Shea Vick,

2005: Andrei Pavelescu, Armin Holschbach, Michael McDuffee, Elena Bogdan, David Fithian,

2004: Corey Hoelscher,

2003: Stephan Schönenberger, James Tripp

### Undergraduate Students

REU Adviser

Gokhan Civan Summer 2006

Invariants derived from the contact homology differential graded algebra.

## Teaching

### Awards:

University of Pennsylvania Department of Mathematics Good Teaching Award: Fall 2004 and Spring 2004

### Graduate:

2008: *Algebraic Topology II Reading course* (with Alan Diaz and Amey Kaloti — Hodge Theory),

2007: *Algebra II, 4-manifold topology, Algebraic Topology I, Reading course* (with James Krysiak and Anh Tran — Differential Topology),

2006: *Algebra I, Reading course* (with Rafal Komendarczyk — Riemannian and Contact geometry),

2004: *Algebraic Topology I, Contact Geometry II, Reading course* (with James Tripp — Confoliations), *Reading course* (with Michael McDuff — Knot Theory),

2003: *Contact Geometry I, 3-manifold topology II, Reading course* (with Stephan Schönenberger — Holomorphic Curves I and II),

2002: *3-manifold topology I, Reading course* (with Sang Seon Kim — Symplectic topology), *Geometry of Curves and Surfaces*

2001 *Topology*

### Undergraduate:

2007: *Reading course* (with Nicole Larsen and AJ Friend — Introduction to Topology),

2006: *Calculus III (Vector Calculus), Algebraic Topology, Reading course* (with Justin Michael — Topics in point set topology), *Reading course* (with Ehsan Najafabadi — Riemannian geometry),

2005: *Honors Differential Equations*,

2004: *Calculus IV* (Spring and Fall),

2002: *Calculus I*,

2001: *Calculus IV, Differential Equations*,

2000: *Differential Equations, Multi-Variable Calculus*,

1998: *Multi-Variable Calculus, Calculus, Linear Algebra*,

Prior to 1998: *Calculus, Elementary Mathematics Education Course*, and *Pre-Calculus*

## Invited Lecture Series/Mini Courses

*Contact geometry and low-dimensional topology*, July, 2006  
Park City Mathematics Institute, Park City, UT.

*Open Books and Contact Geometry*, June, 2004  
Alfred Renyi Institute of Mathematics, Budapest, Hungary.

*Legendrian Knots*, Feb, 2003  
University of Munich, Munich, Germany.

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*Introduction To Contact Geometry,* Sep to Dec, 2002  
Rutgers University, New Brunswick NJ.

### Invited Conference Talks

Illinois-Indiana Symplectic Geometry Conference Indiana University-Purdue University at Indianapolis, Indianapolis, IN.	Mar, 2008
Knotting mathematics and art University of South Florida, Tampa, FL.	Nov, 2007
Workshop on Symplectic Field Theory University of Colima, Colima Mexico.	Jan, 2007
34th Texas Topology and Geometry Conference University of Texas, Austin, TX.	Oct, 2005
Great Lakes Geometry Conference Perimeter Institute for Theoretical Physics, Waterloo Canada.	April, 2005
Georgia Topology Conference University of Georgia, Athens GA.	June, 2004
Floer Homology, Gauge Theory, and Low Dimensional Topology Alfred Renyi Institute of Mathematics, Budapest, Hungary.	June, 2004
Geometry and Topology of Manifolds McMaster University, Hamilton, Canada.	May, 2004
Cornell Topology Festival(also Colloquium) Cornell University, Ithaca, NY.	May, 2004
Topology in and around dimension three BIRS, Banff Canada.	Sep, 2003
Georgia Topology Conference University of Georgia, Athens GA.	June, 2003
Contact Topology in Montreal Montreal, Canada.	Apr, 2003
AMS Invited Address Courant Institute, NYC NY.	Apr, 2003
XVIIIth Annual Geometry Festival: in Honor of P. Griffiths Duke University, Durham NC.	Mar, 2003
Asymptotic Topology, Foliations, and Dynamical Systems Conference University of Munich, Munich, Germany.	Jul, 2002
AMS Regional Meeting Special Session Georgia Institute of Technology, Atlanta GA.	Mar, 2002
Oberwolfach 4-manifolds Conference Oberwolfach, Germany.	Jul, 2001
Georgia International Topology Conference University of Georgia, Athens GA.	May, 2001

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Bay Area Joint Symplectic Geometry Seminar Stanford University, Stanford CA.	Mar, 2001
Bay Area Joint Symplectic Geometry Seminar Stanford University, Stanford CA.	Dec, 2000
Georgia Topology Conference University of Georgia, Athens GA.	Jul, 2000
AMS Regional Meeting Special Session University of California, Santa Barbara CA.	Mar, 2000
Bay Area Topology Seminar University of California, Berkeley CA.	Feb, 2000
West Coast Topology Conference Stanford University, Stanford CA.	Apr, 1999
AMS/MAA Joint National Meeting San Antonio TX.	Jan, 1999
AMS Regional Meeting Special Session Kansas State University, Manhattan KS.	Mar, 1998
Bay Area Joint Symplectic Geometry Seminar University of California, Berkeley CA.	Dec, 1997
AMS Regional Meeting Special Session Georgia Institute of Technology, Atlanta GA.	Oct, 1997
Dehn Surgery Conference University of Arkansas, Fayetteville AR.	Mar, 1997
4-Manifold Workshop Mathematical Sciences Research Institute, Berkeley CA.	Jan, 1997
Georgia Topology Conference University of Georgia, Athens GA.	June, 1996

### Colloquia

Louisiana State University, Baton Rouge, LA	Oct, 2007
Rice University, Houston TX	Mar, 2007
University of Massachusetts, Amherst, MA	Mar, 2006
California State University, Northridge, Northridge, CA	Mar, 2005
University of California, Riverside, Riverside, CA	Mar, 2005
Georgia Institute of Technology, Atlanta GA	Feb, 2005
Rice University, Houston TX	Oct, 2004
Cornell University (also Conference Talk), Ithaca, NY	May, 2004
University of California, San Diego, La Jolla CA	Feb, 2004
University of Southern California, Los Angeles CA	Jan, 2004
George Washington University, Washington D.C.	Oct, 2003

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Dartmouth University, Hanover NH	Oct, 2003
SUNY Buffalo, Buffalo NY	Mar, 2003
Rice University, Houston, Texas	Oct, 2002
Osaka University, Osaka, Japan	May, 2002
George Washington University, Washington D.C.	Mar, 2002
University of Georgia, Athens GA	Mar, 2002
Bryn Mawr, Philadelphia PA	Oct, 2001
Emory University, Atlanta GA	Feb, 2001
University of Pennsylvania, Philadelphia PA	Oct, 2000
Washington University, St. Louis MO	Feb, 2000
Santa Clara University, Santa Clara CA	Oct, 1999
Tulane University, New Orleans LA	Jan, 1999
Auburn University, Auburn AL	Jan, 1999
University of Nevada, Reno NV	Feb, 1998
Emory University, Atlanta GA	Oct, 1997

### Seminar Talks

2008: California Institute of Technology, Pasadena, CA

2007: Louisiana State University, Baton Rouge, LA; Louisiana State University, Baton Rouge, LA; Michigan State University, East Lansing, MI; Michigan State University, East Lansing, MI; Michigan State University, East Lansing, MI; University of Texas, Austin, TX; Columbia University, New York City NY; Rice University, Houston TX; University of Virginia, Charlottesville VA

2006: Emory University, Atlanta,GA; University of Georgia, Athens,GA

2005: University of Georgia, Athens GA; University of Georgia, Athens GA; Rutgers University Analysis Seminar, New Brunswick NJ; California Institute of Technology, Pasadena, CA; University of California, Santa Barbara, Santa Barbara CA; University of California, Berkeley, Berkeley, CA; Stanford University, Palo Alto, CA; Columbia University, New York, NY; University of California, Santa Barbara, Santa Barbara CA

2004: Courant Institute, NYC NY; Columbia University, NYC NY

2003: University of Virginia, Charlottesville VA; Dartmouth University, Hanover NH; Courant Institute, NYC NY; University of California, Berkeley CA; SUNY Buffalo, Buffalo NY; Georgia Technical Institute, Atlanta GA; Princeton University, Princeton NJ

2002: Columbia University, NYC NY; Columbia University, NYC NY; Rutgers University, New Brunswick NJ; Tokyo Institute of Technology, Tokyo, Japan; University of Tokyo, Tokyo, Japan; University of Tokyo, Tokyo, Japan; Johns Hopkins University, Baltimore MD; University of Georgia, Athens GA; Princeton University, Princeton NJ

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2001: University of California, Santa Barbara CA; Rutgers University, New Brunswick NJ; University of California, Berkeley CA

2000: University of Pennsylvania, Philadelphia PA; University of Pennsylvania, Philadelphia PA; State University of New York, Stony Brook NY; University of California, Riverside CA; Columbia University, NYC NY; New York University, NYC NY; Massachusetts Institute of Technology, Cambridge MA; University of Illinois, Urbana IL

1999: University of California, Berkeley CA; University of California, Berkeley CA; University of Texas, Austin TX; University of Texas, Austin TX; Rice University, Houston TX; Tulane University, New Orleans LA; University of Georgia, Athens GA; Duke University, Durham NC; Duke University, Durham NC

1998: University of California, Berkeley CA; University of California, Santa Barbara CA

1997: University of California, Irvine CA; University of California, Berkeley CA; University of Georgia, Athens GA; State University of New York, Stony Brook NY

1996: Rice University, Houston TX

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