Brian E. Raines
Associate Dean for Research, Operations, and Strategic Planning
Professor of Mathematics
College of Arts & Sciences
Baylor University

brian_raines@baylor.edu

Education

Doctorate in Mathematics, University of Oxford
BA in English Literature and Mathematics, Hendrix College

Academic Appointments

Professor of Mathematics, 2015 – present, Baylor University
Associate Professor of Mathematics, 2008—2015, Baylor University
Assistant Professor of Mathematics, 2002—2008, Baylor University

Administrative Assignments

Associate Dean for Research & Strategic Planning, 2018—present (Operations added in 2021)
Associate Dean for Undergraduate Studies, Sciences, 2017—2018
Undergraduate Program Director, Mathematics, 2015—2017

Major Service Engagements

Member of Baylor University Board of Regents (Governing Board), 2021—present
Chair of Faculty Senate, 2019—2020
Executive Committee, Faculty Senate, 2017—2021
Faculty Steering Committee for Revision of Core Curriculum, 2016—2017
Faculty Vision Committee for Revision of Core Curriculum, 2015—2016

Administrative Experience

- **Associate Dean for Research,** current appointment
    - **Involved in the evaluation for tenure and promotion for every faculty member in Arts & Sciences.** Evaluate research of every faculty member and often serve as a proxy for the dean in tenure and promotion discussions with departments.
    - **Co-led the financial group in A&S with a budget of over $130M as we implemented a major change to financial systems.** Functioned as a co-Business Officer of the college alongside an outside consultant, overseeing an operating budget of over $130M, which includes over 500 faculty and staff.
    - **Oversaw rapid growth in research granting in A&S.** The research granting portfolio more than doubled in the sciences and granting in the humanities increased by a factor of six.
    - **Helped launch several new graduate programs.** Supported the design and launch of a new PhD program in Anthropology, an MFA in Film, a joint degree in Ethics with Hong Kong

Baptist University, a joint degree in Global Health with Baylor College of Medicine, and two online revenue-generating master's programs.

- o **Helped design and launch a center for research on human thriving.** The BRIGHTS Center is funded with over $12M in external funds and brings together scholars in the humanities with those in psychology and the social sciences.
- o **Designed and implemented three cluster hiring programs.** The first is a cluster hire in the humanities focused on Bioethics. The other two are in the sciences and focus on Materials Science and Predictive Functional Biology.
- o **Supported the design and approval of the Baylor Ethics Center.** Together with faculty in the humanities working to get university approval for a research center focused on bioethics, data/AI ethics, and medical ethics.
- o **Managed the multi-year process of acquiring and installing a new 300kV transmission electron microscope.** Supported the acquisition of $6M instrument as well as a $1.4M upgrade.
- o **Manage the budget and oversight of over $30M in shared research facilities**. This represents our core shared research instrumentation facilities, a Center for Microscopy, a Center for Mass Spectrometry, a Molecular Biosciences Center, a center for Nuclear Magnetic Resonance, and an Animal Research Center.
- o **Support our 16 doctoral programs and 33 other graduate programs.** We have grown enrollment in our programs from 477 students to 587 students (23% increase) and the number of doctoral graduates has increased from 60 per year to 75 (25% increase).
- o **Worked to draft and implement the college's strategic plan.** In response to the university's new strategic plan, *Illuminate*, we drafted a detailed college-level strategic plan, *Aspire to Illuminate*, giving a roadmap to achieve the goals of the university.
- o **Worked collaboratively** with five faculty focus groups to draft a comprehensive five-year *Core Research Strategic Plan.*
- o **Work on data-informed decisions** regarding all capital equipment requests, contract services and research staff hiring.

- • **Associate Dean for Undergraduate Studies,** 2017—2018
  - o **Support undergraduate science programs in A&S.** Worked with the department chairs and undergraduate program directors to manage all curricular and undergraduate-related issues for the science departments.
  - o **Designed and launched an Office of Undergraduate Research in A&S.** Since the creation of this office, Baylor has risen to #21 in *U.S. News* ranking of universities in the category of "Undergraduate Research/Creative Projects."
  - o L**aunched and managed** an initiative to give seed grants to faculty with an aim to improve student outcomes in our courses with the highest rates of D, F, or W.

- **Undergraduate Program Director, Department of Mathematics,** 2015 – 2017
  - **Managed the teaching of one of the largest departments at Baylor.** We offer thousands of seats of lower-level mathematics courses, starting at pre-calculus.
  - **Redesigned our placement protocols for calculus and precalculus.** Worked to implement a new screening for our lower-level mathematics classes.
  - **Partnered with the other faculty to redesign the math major.** Worked with several other faculty and the department chair to completely redesign the math major with an aim of increasing the number of students and increasing the flexibility of the major.

- **Other major service accomplishments**
  - **Served as Chair of the Faculty Senate during the COVID disruption.** Worked closely with the provost to help stabilize the university and advocate for faculty during the early days of the pandemic.
  - **Advocated for diversity.** As Senate Chair, engaged with the president and the provost to improve our support for under-represented minority students and to respond to growing social media unrest over the student experience.
  - **Served on the steering committee for the _COACHE_ faculty survey.** This led to the creation of a Vice Provost level appointment focused on supporting diversity and belonging at Baylor, implementation of more transparent processes around promotion to full professor, and a full review of departmental bylaws and decision making.
  - **Serve on our Board of Regents.** As a fully vested member of our governing board, served on Finance and Facilities Committee, Academic Affairs Committee, and the Student Life Committee.
  - **Served as one of five faculty leads in the revision of the core curriculum.** A&S revised its core curriculum in a multi-year process.

Publication Highlights (40 publications)

- "Fixed points imply chaos for a class of differential inclusions that arise in economic models," joint with D. Stockman, _Transactions of the AMS_ 364 (2012) 2479–2492.
- "A compact metric space that is universal for orbit spectra of homeomorphisms," joint with C. Good, S. Greenwood and C. Sherman _Advances in Mathematics_ 229 (2012) 2670--2685.
- "Chaotic sets and Euler equation branching," joint with D. Stockman, _Journal of Mathematical Economics_ 46 (2010) 1173--1193.
- "Chain transitivity and variations of the shadowing property," joint with W. R. Brian and J. Meddaugh, _Ergodic Theory and Dynamical Systems_, 7 (2015), 2044--2052.

External Funding

- NSF: "50th Spring Topology and Dynamical Systems Conference" (3/1/2016 -- 3/1/2017), joint with W. Brian and D. Ryden, ($39,963)

- NSF: "Classifying a model for the Hen'on Attractor: a U.S. -- Croatia Collaboration," (7/1/2006 -- 7/1/2010), joint with S. Stimac ($92,750 total, with $46,375 funded by NSF and $46,375 funded by the Croatian Ministry of Science)
- EAF (educational foundation): "Implementing the Discovery Method in the United Kingdom: a Travel Grant," (9/1/2004 -- 8/31/2005), joint with C. Good ($8,700)
- EAF (educational foundation): "Utilizing Graduate Teaching Assistants with Discovery Learning at the Advanced Undergraduate Level," (8/15/2004 -- 5/31/2005), joint with W.T. Ingram ($30,864)
- EAF (educational foundation): "Teaching via the Discovery Method: a Mentoring Project," (8/15/2002 – 5/31/2004), joint with W.T. Ingram ($55,978)

Doctoral Students

1. Leslie Jones, PhD (2009)
2. Brent Hamilton, PhD (2011)
3. Casey Sherman, PhD (2012)
4. Nathan Averbeck, PhD (2016)
5. Reeve Hunter, PhD (2016)
6. Timothy Tennant, PhD (2016)
7. Jasmin Mohn, PhD (2023)

Selected Invited Presentations (39 invited colloquiua/plenary/semi-plenary research lectures)

One-hour colloquium, Mathematics Department, TCU, March 2018.

One-hour plenary address, 51st Spring Topology and Dynamics Conference, March 2017.

30-minute semi-plenary address, Devonport Topology Festival, Auckland NZ, February 2016.

One-hour colloquium, Computer Science Department, Tulane, September 2013.

One-hour presentation, Mathematics Department, University of Auckland, New Zealand, April 2010.

Seventy-five-minute colloquium, Economics Department, University of Delaware, November 2009.

One-hour plenary lecture, Workshop on Nonlinear Dynamics, University of Udine, Italy, September 2007.

One-hour plenary lecture, Davenport Topology Festival, Auckland, New Zealand, February 2007.

One-hour colloquium, University of Zagreb, Zagreb Croatia, June 2006.

Five-hour Mini-Course, Institute of Mathematics, Universidad National Autonoma Mexico, Mexico City, Mexico, November 2005.

One-hour colloquium, Economics Faculty, University of Venice, Venice, Italy, January 2005.

One-hour seminar, Mathematics Faculty, University of Zagreb, Zagreb, Croatia, January 2005.

One-hour seminar, Economics Department, University of Birmingham, Birmingham, UK, November 2004.

4

One-hour seminar, Analytic Topology Seminar, Oxford University, Oxford, UK, June 2004.

One-hour seminar, Analytic Topology Seminar, Oxford University, Oxford, UK, August 2003.

One hour presentation, Oxford-Galway Topology Colloquium, University of Birmingham, Birmingham, UK, April 2003

Service to the Profession

Lead Organizer for 50th Spring Topology and Dynamical Systems Conference.

Member of Steering Committee for Spring Topology and Dynamics Conference (2010-2021)

Guest-editor for *Topology and its applications* special issue devoted to the Conference in Honour of the 60th Birthdays of P.J. Collins and G.M. Reed.

Referee for *Annals of Mathematics, Applied Mathematics and Computation, Proceedings of the AMS, Discrete and Continuous Dynamical Systems, Ergodic Theory and Dynamical Systems, Fundamenta Mathematica, Topology and its Applications, Journal of Economic Dynamics and Control, Journal of Mathematical Economics, Houston Journal of Mathematics, Topology Proceedings, Transactions of the AMS.*

 Grant reviewer for NSF, AMS, EAF, and MLI (2002-present).

Service to the University

Member of Faculty Senate (2014-2021)

Faculty Senate Chair (2019-2020)

Faculty Senate Executive Committee (2017-2021)

Co-Chair of Curriculum Committee, College of Arts & Sciences (2017-2018)

Chair of Taskforce on Revising Student Course Evaluations (2015-2016)

Member of COACHE taskforce (2020-2022)

Member of Illuminate Steering Committee (2018-2020)

Member of Provost Search Committee (2018-2019)

Member of Enrollment Management Council (2018-2020)

Member of Academic Capacity Committee (2018-2019)

Member of Search Committee for Director of McNair Scholar's Program (2017-2018)

Steering Committee for Core Curriculum Revision Taskforce (2016-2017)

Member of Core Curriculum Revision Taskforce (2016-2017)

Member of Dean's Taskforce to Draft a Vision Statement for the Core Curriculum (2015-2016)

Chair of Scholarship Committee, Mathematics Department (2007-2017)

Course Coordinator for Business Calculus (2008-2016)

Undergraduate Advisor, Mathematics Department (2002-2018)

Organizer for *Distinguished Scholar Day*, Mathematics Department (2015-2017)

Member of Undergraduate and Graduate Curriculum Committee, Development Committee, and Personnel Committee, Mathematics Department (2007-2018)

Undergraduate Research Mentor for 14 students.

Teaching mentor for many graduate student instructors.

Departmental representative to *Invitation to Excellence*, *Baylor Premiere*, and *Know where you're going day.* (Many times from 2002-2018)

Publications

1. "Distributional chaos in subshifts of Baire space," joint with J. Mohn, *submitted.*
2. "Infinite specification and omega-chaos," Joint with C. Hammon, J. Mohn, and J. Meddaugh, *submitted.*
3. "Infinite Specification and distributional chaos in the Baire space," joint with J. Mohn, Top. Proc. 62 (2023), 197-203.
4. "A characterization of omega-limit sets in subshifts of Baire space," joint with J. Meddaugh, J.. Math. Anal. Appl. 500 (2021), no. 1, 1--14.
5. "Shadowing is generic on dendrite," joint with W. Brian and J. Meddaugh, Discrete and Continuous Dyn. Sys no. 8 (2019), 2211--2220.
6. "Weak specification and Baire space" joint with J. Meddaugh, J. Math. Anal. Appl. 479 (2019), no. 1, 1355–1363.
7. "The specification property on a set-valued map and its inverse limit," joint with T. Tennant, Houston J. Math 44 (2018) 665--677.
8. "Invariant measures on multi-valued functions," joint with J. Meddaugh and T. Tennant, J. Math. Anal. Appl. 456 (2017) 616--627.
9. "Omega chaos and the specification property," joint with R. Hunter, J.. Math. Anal. Appl. 448 (2017) 908--913.
10. "Chaotic pairs for shift maps," joint with N. Averbeck, Houston J. Math. 42 (2016) 1367--1372.
11. "Scrambled sets in shift spaces on a countable alphabet," joint with T. Underwood, Proceedings of the AMS, 144 (2016), 217--224.
12. "Distributional Chaos in Dendritic and Circular Julia Sets," joint with N. Averbeck, J. of Mathematical Analysis and its Applications, 2 (2015), 951-958.
13. "Chain transitivity and variations of the shadowing property," joint with W. R. Brian and J. Meddaugh, Ergodic Theory and Dynamical Systems, 7 (2015), 2044--2052.
14. "Limit sets for Z^d actions," joint with J. Meddaugh Discrete and Continuous Dynamical System A, 11, (2014) 4765--4780.

15. "Shadowing and omega-limits sets of circular Julia sets," joint with A. Barwell and J. Meddaugh, Ergodic Theory and Dynamical Systems, 4 (2015), 1045—1055

16. "The omega-limit sets of quadratic Julia sets," joint with A. Barwell, Ergodic Theory and Dynamical Systems, 2 (2015), 337--358.

17. "Shadowing and internal chain transitivity," joint with J. Meddaugh, Fundamenta Mathematica, 222, (2013) 279—287.

18. "Chaos for successive maxima map implies chaos for the original map," joint with A. Boyarsky, P. Eslami, P. Gora, Z. Li, and J. Meddaugh, Nonlinear Dynamics, 79 (2015), 2165--2175.

19. "Characterizations of omega-limits sets in topologically hyperbolic systems," joint with A. Barwell, C. Good, and P. Oprocha, Discrete and Continuous Dynamical Systems A 33 (2013) 1819--1833.

20. "A compact metric space that is universal for orbit spectra of homeomorphisms," joint with C. Good, S. Greenwood and C. Sherman Advances in Mathematics 229 (2012) 2670--2685.

21. "Fixed points imply chaos for a class of differential inclusions that arise in economic models," joint with D. Stockman Transactions of the AMS 364 (2012) 2479–-2492.

22. "Implicit equilibrium dynamics," joint with A. Medio Macroeconomic Dynamics 16 (2012), 518--555.

23. "Chaotic sets and Euler equation branching," joint with D. Stockman Journal of Mathematical Economics 46 (2010) 1173--1193.

24. "Basins of measures on inverse limit spaces for the induced homeomorphism," joint with J. Kennedy and D. Stockman Ergodic Theory and Dynamical Systems 30 (2010) 1119--1130.

25. "A Characterization of Omega-limit sets in shift spaces," joint with A. Barwell, C. Good and R.W. Knight Ergodic Theory and Dynamical Systems 30 (2010), 21--31.

26. "Countable inverse limits of postcritical omega-limit sets of unimodal maps," joint with C. Good and R.W. Knight Discrete and Continuous Dynamical Systems. Series A 27 (2010) 1059—1078

27. "Homeomorphisms of unimodal inverse limit spaces with a non-recurrent critical point," joint with L. Block, J. Keesling, and S. Stimac, Topology and its Applications 156 (2009) 2417--2425.

28. "A Classification of inverse limit spaces of tent maps with a non-recurrent critical point," joint with S. Stimac Algebraic and Geometric Topology (2009), 1--34.

29. "Uncountable omega-limit sets with isolated points," joint with C. Good and R. Suabedissen Fundamenta Mathematica 205 (2009), no. 2, 179–189.

30. "Backward dynamics in economics. The inverse limit approach," joint with A. Medio Journal of Economic Dynamics and Control 31 (2007), 1633--1671.

31. "Structure of Inverse Limit Spaces of Tent Maps with Nonrecurrent Critical Points," joint with S. Stimac, Glasnik Mathematicae 42 (2007), 43--56.

32. "Local planarity in one-dimensional continua," Topology and its Applications 154 (2007) 972--984.

33. "Non-hyperbolic one-dimensional invariant sets with a countably infinite collection of inhomogeneities," joint with C. Good and R.W. Knight Fundamenta Mathematicae 192 (2006), 267 --289.

34. "Inverse limit spaces arising from problems in economics," joint with A. Medio Topology and its Applications 153 (2006) 3437--3449.

35. "Chainabilty and Hemmingsen's theorem," joint with T Banakh, P. Bankston W. Ruitenburg Topology and its Applications 153 (2006) 2462 -- 2468.

36. "Continuum many tent map inverse limits with homeomorphic postcritical omega-limit sets," joint with C. Good Fundamenta Mathematicae 191 (2006) 1-21.

37. "Inhomogeneities in non-hyperbolic one-dimensional invariant sets," Fundamenta Mathematicae 182 (2004) 241-268.

38. "Inverse limits of tent maps without the pseudo-orbit shadowing property," Topology Proceedings 27 (2002) 1-9.

39. "Orbits of turning points for maps of finite graphs and inverse limit spaces," The Proceedings of the Ninth Prague Topological Symposium (2002) 253-263.

40. "Inverse limits on [0,1] using sequences of piecewise linear unimodal bonding maps," Topology and its Applications 124 (2002) 159-170.