

# Bjørn Kjos-Hanssen

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**13 Media****18****1 Personal**

- Citizen of Norway. Permanent resident of the United States.
- Transliterated form of name: *Bjoern Kjos-Hanssen*.

**2 Employment***University of Hawai'i at Mānoa, Department of Mathematics*

- Professor, since 2015.
- Associate professor, 2010–2015.
- Assistant professor, 2007–2010.

*Cornell University, Department of Mathematics*

- Visiting assistant professor, 2006–2007.

*University of Connecticut, Storrs, Department of Mathematics*

- Postdoctoral fellow, 2004–2006.

*Universität Heidelberg, Institut für Informatik*

- Marie Curie fellow of the European Community Programme “Improving Human Potential”, 2002–2004.

**3 Education***University of California, Berkeley*

- Doctor of Philosophy (PhD), Logic and the methodology of science, 2002. Dissertation: *Lattice initial segments of the Turing degrees*. Adviser: Theodore A. Slaman.

*Universitetet i Oslo*

- Candidatus scientiarum (Master), Mathematics, 1997.
- Candidatus magisterii (Bachelor), Mathematics, 1996.

**4 Visiting positions**

- Sabbatical visitor, University of Oslo, Fall 2013.
- Visiting associate professor, Department of Mathematics, University of California, San Diego, Winter and Spring 2011.
- Member, Institute for Mathematical Sciences, National University of Singapore, Summer 2005.

## 5 Selected awards, grants, and contracts

Year	Sponsor	Type	Amount
2002	European Commission	Federal (EU)	€139,950
2009	NSF	Federal (US)	\$198,892
2014	Simons Foundation	Private foundation	\$35,000
2015	NSF	Federal (US)	\$22,480
2018	Outreach College	UH internal	\$4,360
2019	Undergraduate Research Opportunities Program	UH internal	\$4,037
2020	Decision Research Corporation	Private company	\$7,705
2020	Simons Foundation	Private foundation	\$42,000

- 2020 **Simons Foundation: Collaboration Grants For Mathematicians**. Title: “Computability and automatic complexity”. Principal investigator. Award Number: 704836. Total cost: \$42,000. Dates: September 1, 2020 – August 31, 2024.
- 2020 **Decision Research Corporation**, Honolulu. \$7,705. Title: “Automatic complexity of Fibonacci arrays”.
- 2019 **Undergraduate Research Opportunities Program: Faculty Mentoring Grants for Summer Undergraduate Research and Creative Works**. \$4,037. Title: “Vapnik-Chervonenkis dimension and the Separating Words problem”. Office of the Vice Chancellor for Research, University of Hawai‘i at Mānoa.
- 2018 **Outreach College OER grant**, University of Hawai‘i at Mānoa. Title: “Univariate statistics and model selection”. Open Educational Resources textbook contract. \$4,360 for work performed November 16 – December 14, 2018.
- 2015 **NSF conference grant**. Title: “11th International Conference on Computability, Complexity and Randomness”. Principal Investigator. Award Number: 1545707. Total cost: \$22,480. Dates: November 1, 2015 – October 31, 2016. Dates of the conference: January 4–8, 2016.
- 2014 **Simons Foundation: Collaboration Grants For Mathematicians**. Title: “Automatic complexity”. Principal investigator. Award Number: 315188. Total cost: \$35,000. Dates: September 1, 2014 – August 31, 2019.
- 2009 **NSF standard grant** “Computability and probability”. Principal investigator, NSF-DMS-0901020. Total cost: \$199,892. Dates: 2009-08-15 – 2013-07-31.
- 2007 **Focused Research Group** - Collaborative Research: Algorithmic Randomness. Co-PI with Eric W. Allender, Douglas A. Cenzer, Peter Cholak, Lance Fortnow, Denis R. Hirschfeldt, John M. Hitchcock, Jack Lutz, R. Daniel Mauldin, Joseph S. Miller, Theodore A. Slaman, Stephen G. Simpson, and Rebecca Weber, NSF-DMS-0652669. Total Cost: \$500,000. Travel and overhead for Kjos-Hanssen: \$27,000. Dates: 2007-07-01 – 2010-06-30.
- 2002 **Marie Curie Fellowship** of the European Community Programme “Improving Human Potential”, Contract No. HPMF-CT-2002-01888, University of Heidelberg, Germany, awarded 2002-09-13 to 2004-09-12 but only served until Jan. 2004. Title: “Computability theory, effective forcing constructions, and applications to degree structures”. Two-year full time research fellowship, total cost EUR 139,950.

## 6 Service

### 6.1 Department of Mathematics (selected service items)

- Webmaster, since 2010.
- Chair of department personnel committee, 2020–2021.
- Chair of hiring committees (Temporary Assistant Professors 2014–2018, Assistant Professors 2019–2020).

### 6.2 College of Natural Sciences

2014–2017 Program and Curriculum Committee.

### 6.3 University of Hawaii at Manoa

2012–2014 Foundations Board.

### 6.4 The profession

- Served on two *Tenure and Promotion Review Committees* (including one as Chair) and served as External Reviewer for two tenure cases.
- Moderator (elected 2018), Theoretical Computer Science [cstheory.stackexchange.com](http://cstheory.stackexchange.com).
- Editor (since 2019), *Journal of Logic and Analysis*.

## 7 Conference organization

Chair of the organizing committee for CCR (Computability, Complexity and Randomness) 2016, Honolulu, HI, January 4–8, 2016 (also Program Committee member).

### Service on committees.

- [1] Computability in Europe, Milano, Italy, June 2013. Program committee member.
- [2] Bjørn Kjos-Hanssen and Adolf Mader (local organizers), Western Sectional Meeting of the American Mathematical Society, University of Hawai'i at Mānoa, March 2012.
- [3] 6th Conference on Complexity, Computability and Randomness, Cape Town, South Africa, January 2011. Program committee member.
- [4] 5th Conference on Logic, Computability and Randomness, Notre Dame, Indiana, May 2010. Program committee member.
- [5] NSF Focused Research Group in Algorithmic Randomness, *Informal Gathering*, University of Hawai'i at Mānoa, January 2010. Chair of local and scientific arrangements.
- [6] Winter Meeting, Association of Symbolic Logic (Joint Mathematics Meetings), San Francisco, January 2010. Program committee member.

### Organizing special sessions.

- [1] Doug Cenzer and Bjørn Kjos-Hanssen (organizers), *Special Session on Classical Computability Theory*, Computability in Europe, Sofia, Bulgaria, June 2011.
- [2] Cameron E. Freer and Bjørn Kjos-Hanssen (organizers), *Special Session on Computability and Complexity*, American Mathematical Society Sectional Meeting, University of Hawai'i at Mānoa, March 2012.
- [3] Achilles A. Beros and Bjørn Kjos-Hanssen (organizers), *Special Session on Computability, Complexity and Learning*, American Mathematical Society Joint Western and Central Sectional Meeting, University of Hawai'i at Mānoa, March 2019.

## 8 Publications

### 8.1 Journal articles

- [1] Bjørn Kjos-Hanssen, *Local initial segments of the Turing degrees*, Bull. Symbolic Logic **9** (2003), no. 1, 26–36. MR1959967 (2003m:03063)
- [2] Klaus Ambos-Spies, Bjørn Kjos-Hanssen, Steffen Lempp, and Theodore A. Slaman, *Comparing DNR and WWKL*, J. Symbolic Logic **69** (2004), no. 4, 1089–1104. MR2135656 (2006c:03061)
- [3] Bjørn Kjos-Hanssen, André Nies, and Frank Stephan, *Lowness for the class of Schnorr random reals*, SIAM J. Comput. **35** (2005), no. 3, 647–657 (electronic). MR2201451 (2006j:68051)
- [4] Stephen Binns, Bjørn Kjos-Hanssen, Manuel Lerman, and Reed Solomon, *On a conjecture of Dobrinen and Simpson concerning almost everywhere domination*, J. Symbolic Logic **71** (2006), no. 1, 119–136. MR2210058 (2006m:03070)
- [5] Bjørn Kjos-Hanssen, *Low for random reals and positive-measure domination*, Proc. Amer. Math. Soc. **135** (2007), no. 11, 3703–3709 (electronic). MR2336587 (2008g:03070)
- [6] Stephen Binns, Bjørn Kjos-Hanssen, Manuel Lerman, James H. Schmerl, and Reed Solomon, *Self-embeddings of computable trees*, Notre Dame J. Form. Log. **49** (2008), no. 1, 1–37. MR2376778 (2008m:03093)
- [7] Stephen Binns and Bjørn Kjos-Hanssen, *Finding paths through narrow and wide trees*, J. Symbolic Logic **74** (2009), no. 1, 349–360. MR2499434 (2010b:03012)
- [8] Bjørn Kjos-Hanssen, *Infinite subsets of random sets of integers*, Math. Res. Lett. **16** (2009), no. 1, 103–110. MR2480564 (2010b:03051)
- [9] Bjørn Kjos-Hanssen and Anil Nerode, *Effective dimension of points visited by Brownian motion*, Theoret. Comput. Sci. **410** (2009), no. 4–5, 347–354. MR2493984 (2009k:68100)
- [10] Bjørn Kjos-Hanssen and André Nies, *Superhighness*, Notre Dame J. Form. Log. **50** (2009), no. 4, 445–452 (2010), DOI 10.1215/00294527-2009-020. MR2598873
- [11] Bjørn Kjos-Hanssen, *The probability distribution as a computational resource for randomness testing*, J. Log. Anal. **2** (2010), Paper 10, 13. MR2737709
- [12] Bjørn Kjos-Hanssen, André Nies, Frank Stephan, and Liang Yu, *Higher Kurtz randomness*, Ann. Pure Appl. Logic **161** (2010), no. 10, 1280–1290, DOI 10.1016/j.apal.2010.04.001. MR2652197
- [13] Richard A. Shore and Bjørn Kjos-Hanssen, *Lattice initial segments of the hyperdegrees*, J. Symbolic Logic **75** (2010), no. 1, 103–130. MR2605884
- [14] Bjørn Kjos-Hanssen and Tamás Szabados, *Kolmogorov complexity and strong approximation of Brownian motion*, Proc. Amer. Math. Soc. **139** (2011), no. 9, 3307–3316, DOI 10.1090/S0002-9939-2011-10741-X. MR2811285
- [15] Bjørn Kjos-Hanssen, Wolfgang Merkle, and Frank Stephan, *Kolmogorov complexity and the recursion theorem*, Trans. Amer. Math. Soc. **363** (2011), no. 10, 5465–5480, DOI 10.1090/S0002-9947-2011-05306-7. MR2813422
- [16] Bjørn Kjos-Hanssen, *A strong law of computationally weak subsets*, J. Math. Log. **11** (2011), no. 1, 1–10, DOI 10.1142/S0219061311000980. MR2833148
- [17] David Diamondstone and Bjørn Kjos-Hanssen, *Martin-Löf randomness and Galton-Watson processes*, Ann. Pure Appl. Logic **163** (2012), no. 5, 519–529, DOI 10.1016/j.apal.2011.06.010. MR2880270
- [18] Bjørn Kjos-Hanssen, Joseph S. Miller, and Reed Solomon, *Lowness notions, measure and domination*, J. Lond. Math. Soc. (2) **85** (2012), no. 3, 869–888, DOI 10.1112/jlms/jdro72. MR2927812
- [19] Bjørn Kjos-Hanssen, Frank Stephan, and Jason Teutsch, *Arithmetic complexity via effective names for random sequences*, ACM Trans. Comput. Log. **13** (2012), no. 3, Art. 24, 18, DOI 10.1145/2287718.2287724. MR2972937
- [20] Cameron E. Freer and Bjørn Kjos-Hanssen, *Randomness extraction and asymptotic Hamming distance*, Log. Methods Comput. Sci. **9** (2013), no. 3, 3:27, 14, DOI 10.2168/LMCS-9(3:27)2013. MR3116543
- [21] Cameron Freer, Bjørn Kjos-Hanssen, André Nies, and Frank Stephan, *Algorithmic aspects of Lipschitz functions*, Computability **3** (2014), no. 1, 45–61. MR3216774
- [22] Bjørn Kjos-Hanssen, Antoine Taveneaux, and Neil Thapen, *How much randomness is needed for statistics?*, Ann. Pure Appl. Logic **165** (2014), no. 9, 1470–1483, DOI 10.1016/j.apal.2014.04.014. MR3210079
- [23] Bjørn Kjos-Hanssen, Paul Kim Long V. Nguyen, and Jason M. Rute, *Algorithmic randomness for Doob’s martingale convergence theorem in continuous time*, Log. Methods Comput. Sci. **10** (2014), no. 4, 4:12, 35, DOI 10.2168/LMCS-10(4:12)2014. MR3296473
- [24] Kayleigh K. Hyde and Bjørn Kjos-Hanssen, *Nondeterministic automatic complexity of overlap-free and almost square-free words*, Electron. J. Combin. **22** (2015), no. 3, Paper 3.22, 18. MR3386523
- [25] Bjørn Kjos-Hanssen, *Kolmogorov structure functions for automatic complexity*, Theoret. Comput. Sci. **607** (2015), no. 3, 435–445, DOI 10.1016/j.tcs.2015.05.052. MR3429064
- [26] Malihe Alikhani, Bjørn Kjos-Hanssen, Amirarsalan Pakravan, and Babak Saadat, *Pricing complexity options*, Algorithmic Finance **4** (2015), no. 3–4, 127–137, DOI 10.3233/AF-150050. MR3454815

- [27] Katie Brodhead, Mushfeq Khan, Bjørn Kjos-Hanssen, William A. Lampe, Paul Kim Long V. Nguyen, and Richard A. Shore, *The strength of the Grätzer-Schmidt theorem*, Arch. Math. Logic **55** (2016), no. 5-6, 687–704, DOI 10.1007/s00153-016-0488-5. MR3523650
- [28] Bjørn Kjos-Hanssen, Frank Stephan, and Sebastiaan A. Terwijn, *Covering the recursive sets*, Ann. Pure Appl. Logic **168** (2017), no. 4, 804–823, DOI 10.1016/j.apal.2016.10.017. MR3603654
- [29] Bjørn Kjos-Hanssen, *A conflict between some semantic conditions of Carmo and Jones for contrary-to-duty obligations*, Studia Logica **105** (2017), no. 1, 173–178, DOI 10.1007/s11225-016-9686-8. MR3607634
- [30] ———, *On the complexity of automatic complexity*, Theory Comput. Syst. **61** (2017), no. 4, 1427–1439, DOI 10.1007/s00224-017-9795-4. MR3712310
- [31] ———, *Automatic complexity of shift register sequences*, Discrete Math. **341** (2018), no. 9, 2409–2417, DOI 10.1016/j.disc.2018.05.015. MR3828751
- [32] ———, *Permutations of the integers induce only the trivial automorphism of the Turing degrees*, Bull. Symb. Log. **24** (2018), no. 2, 165–174, DOI 10.1017/bsl.2018.15. MR3840751
- [33] Rod Downey, Denis Hirschfeldt, and Bjørn Kjos-Hanssen, *Preface [Computability, Complexity, and Randomness 2016 (CCR 2016)]*, Theory Comput. Syst. **62** (2018), no. 7, 1553–1554, DOI 10.1007/s00224-018-9853-6. Held at the University of Hawai‘i, Honolulu, HI, January 4–8, 2016. MR3832107
- [34] Bjørn Kjos-Hanssen, *Only human [book review of The Turing guide, MR3618873]*, Notices Amer. Math. Soc. **66** (2019), no. 4, 556–561. MR3889530
- [35] ———, *Few paths, fewer words: model selection with automatic structure functions*, Exp. Math. **28** (2019), no. 1, 121–127, DOI 10.1080/10586458.2017.1368048. MR3938583
- [36] Bjørn Kjos-Hanssen and Lu Liu, *Extracting randomness within a subset is hard*, European Journal of Mathematics (2020), accepted.
- [37] Bjørn Kjos-Hanssen and Lei Liu, *The number of languages with maximum state complexity*, Algebra Universalis (2021), under revision.
- [38] Bjørn Kjos-Hanssen, *Automatic complexity of Fibonacci and Tribonacci words*, Discrete Applied Mathematics **293** (2021), under revision.

## 8.2 Books and book chapters

“Book chapter” here means a chapter in a book earning royalties.

- [1] Denis R. Hirschfeldt, Carl G. Jockusch Jr., Bjørn Kjos-Hanssen, Steffen Lempp, and Theodore A. Slaman, *The strength of some combinatorial principles related to Ramsey’s theorem for pairs*, Computational prospects of infinity. Part II. Presented talks, Lect. Notes Ser. Inst. Math. Sci. Natl. Univ. Singap., vol. 15, World Sci. Publ., Hackensack, NJ, 2008, pp. 143–161. MR2449463 (2009i:03038)
- [2] Bjørn Kjos-Hanssen and Samuel D. Birns, *Statistics for Calculus Students*, University of Hawai’i at Mānoa, Open Educational Resources, 2019.
- [3] Achilles A. Beros, Mushfeq Khan, Bjørn Kjos-Hanssen, and André Nies, *Immunity, diagonalisation and the complexity of mass problems*, Aspects of Computation, Lect. Notes Ser. Inst. Math. Sci. Natl. Univ. Singap., vol. 39, World Sci. Publ., Hackensack, NJ, 2021, accepted.
- [4] Bjørn Kjos-Hanssen, *A tractable case of the Turing automorphism problem: bi-uniformly  $E_0$ -invariant Cantor homeomorphisms*, Higher recursion theory and set theory, Lect. Notes Ser. Inst. Math. Sci. Natl. Univ. Singap., vol. 40, World Sci. Publ., Hackensack, NJ, 2022, accepted.

## 8.3 Conference papers

### A. Published articles that have not yet been superseded by journal articles:

- [1] Paul Brodhead and Bjørn Kjos-Hanssen, *Numberings and randomness*, Mathematical theory and computational practice, Lecture Notes in Comput. Sci., vol. 5635, Springer, Berlin, 2009, pp. 49–58. MR2545879
- [2] Bjørn Kjos-Hanssen and Jan Reimann, *The strength of the Besicovitch-Davies theorem*, Programs, proofs, processes, Lecture Notes in Comput. Sci., vol. 6158, Springer, Berlin, 2010, pp. 229–238, DOI 10.1007/978-3-642-13962-8\_26. MR2678134
- [3] Bjørn Kjos-Hanssen, *A rigid cone in the truth-table degrees with jump*, Computability and complexity, Lecture Notes in Comput. Sci., vol. 10010, Springer, Cham, 2017, pp. 487–500. MR3629737
- [4] ———, *Superposition as memory: unlocking quantum automatic complexity*, Unconventional computation and natural computation, Lecture Notes in Comput. Sci., vol. 10240, Springer, Cham, 2017, pp. 160–169. MR3668337
- [5] Achilles A. Beros, Bjørn Kjos-Hanssen, and Daylan Kauai Yogi, *Planar digraphs for automatic complexity*, Theory and Applications of Models of Computation, Lecture Notes in Comput. Sci., Springer, Cham, 2019.

### B. Published articles that have been superseded by journal articles:

- [1] Bjørn Kjos-Hanssen, Wolfgang Merkle, and Frank Stephan, *Kolmogorov complexity and the recursion theorem*, STACS 2006, Lecture Notes in Comput. Sci., vol. 3884, Springer, Berlin, 2006, pp. 149–161. MR2249365 (2008a:68100)
- [2] Bjørn Kjos-Hanssen and Anil Nerode, *The law of the iterated logarithm for algorithmically random Brownian motion*, Logical foundations of computer science, Lecture Notes in Comput. Sci., vol. 4514, Springer, Berlin, 2007, pp. 310–317. MR2389734 (2009a:60030)
- [3] Paul Brodhead and Bjørn Kjos-Hanssen, *The strength of the Grätzer-Schmidt theorem*, Mathematical theory and computational practice, Lecture Notes in Comput. Sci., vol. 5635, Springer, Berlin, 2009, pp. 59–67. MR2545880
- [4] David Diamondstone and Bjørn Kjos-Hanssen, *Members of random closed sets*, Mathematical theory and computational practice, Lecture Notes in Comput. Sci., vol. 5635, Springer, Berlin, 2009, pp. 144–153. MR2545889
- [5] Bjørn Kjos-Hanssen, Antoine Taveneaux, and Neil Thapen, *How much randomness is needed for statistics?*, How the world computes, Lecture Notes in Comput. Sci., vol. 7318, Springer, Heidelberg, 2012, pp. 395–404, DOI 10.1007/978-3-642-30870-3\_40. MR2983702
- [6] Cameron E. Freer and Bjørn Kjos-Hanssen, *Randomness extraction and asymptotic Hamming distance [reprint of MR3116543]*, Log. Methods Comput. Sci. **The Ninth International Conference on Computability and Complexity in Analysis (CCA) 2012** (2013/14), 14. MR3299492
- [7] Kayleigh K. Hyde and Bjørn Kjos-Hanssen, *Nondeterministic automatic complexity of almost square-free and strongly cube-free words*, Computing and combinatorics, Lecture Notes in Comput. Sci., vol. 8591, Springer, Cham, 2014, pp. 61–70, DOI 10.1007/978-3-319-08783-2\_6. MR3247576
- [8] Bjørn Kjos-Hanssen, *Kolmogorov structure functions for automatic complexity in computational statistics*, Combinatorial optimization and applications, Lecture Notes in Comput. Sci., vol. 8881, Springer, Cham, 2014, pp. 652–665, DOI 10.1007/978-3-319-12691-3\_49. MR3297404
- [9] Bjørn Kjos-Hanssen, Frank Stephan, and Sebastiaan A. Terwijn, *Covering the recursive sets*, Evolving computability, Lecture Notes in Comput. Sci., vol. 9136, Springer, Cham, 2015, pp. 44–53, DOI 10.1007/978-3-319-20028-6\_5. MR3382344
- [10] Achilles A. Beros, Mushfeq Khan, and Bjørn Kjos-Hanssen, *Effective bi-immunity and randomness*, Computability and complexity, Lecture Notes in Comput. Sci., vol. 10010, Springer, Cham, 2017, pp. 633–643. MR3629746

- [11] Bjørn Kjos-Hanssen, *Permutations of the integers induce only the trivial automorphism of the Turing degrees*, Computability and complexity, Lecture Notes in Comput. Sci., vol. 10010, Springer, Cham, 2017, pp. 599–607. MR3629743
- [12] ———, *Shift registers fool finite automata*, Logic, language, information, and computation, Lecture Notes in Comput. Sci., vol. 10388, Springer, Berlin, 2017, pp. 170–181. MR3690821
- [13] Achilles A. Beros, Mushfeq Khan, Bjørn Kjos-Hanssen, and André Nies, *From eventually different functions to pandemic numberings*, Sailing routes in the world of computation, Lecture Notes in Comput. Sci., vol. 10936, Springer, Cham, 2018, pp. 97–106. MR3840156
- [14] Bjørn Kjos-Hanssen and Lei Liu, *The number of languages with maximum state complexity*, Theory and Applications of Models of Computation, Lecture Notes in Comput. Sci., Springer, Cham, 2019.

### *Preprints*

- [1] Bjørn Kjos-Hanssen, *Lattice initial segments of the Turing degrees below  $0'$* , arXiv 0901.3876.
- [2] Alberto Evangelista and Bjørn Kjos-Hanssen, *Google distance between words*, arXiv 0901.4180.



## 9 Reviewing and refereeing

- Referee for many journals including Proceedings of the AMS, Journal of Symbolic Logic, Bulletin of Symbolic Logic, Notre Dame Journal of Formal Logic, Journal of Mathematical Logic, Mathematical Logic Quarterly, and Lecture Notes in Computer Science.
- Reviewer of grant proposals for NSF (mail review and on-site panel review) and some other agencies.

## 10 Courses taught

### 10.1 *University of California, Berkeley, 1998–2002*

Teaching assistant for:

- Math 1A (Calculus)
- Math 1B (Calculus)
- Math 53 (Multivariable Calculus)
- Math 54 (Linear algebra and differential equations)
- Philosophy 12A (Introduction to logic)

Instructor of record for:

- Math 54 (Linear algebra and differential equations)
- Math 55 (Discrete mathematics)
- Math 113 (Introduction to abstract algebra)

### 10.2 *University of Connecticut, Storrs, 2004–2006*

- Math 116 [now 1132Q] (Calculus II)
- Math 204 [now 3710] (Introduction to Mathematical Modeling)
- Math 210 [now 2110Q] (Multivariable Calculus)
- Math 223 [now 2360Q] (Geometry)
- Math 231 [now 3160] (Probability)
- Math 235 [now 3260] (Introduction to Mathematical Logic)
- Math 247 [now 2010Q] (Fundamentals of algebra and geometry)

### 10.3 *Cornell University, 2006–2007*

- Math 414 [now MATH 4140] (Honors Introduction to Analysis II)
- Math 481 [now MATH 4810] (Mathematical Logic)
- Math 787 [now MATH 6870] (Set Theory)
- Math 788 [now MATH 7850] (Topics in Logic: Kolmogorov complexity)

*10.4 University of California, San Diego, 2011*

- Math 11/11L (Elementary Probability & Statistics)
- Math 181A (Mathematical Statistics)

*10.5 University of Hawai'i at Mānoa, since 2007*

- Finance 651 (Stochastic calculus and PDEs)
- Math 100 (Survey of mathematics)
- Math 241 (Calculus I)
- Math 242 (Calculus II)
- Math 243 (Calculus III)
- Math 244 (Calculus IV)
- Math 251A (Accelerated Calculus I)
- Math 252A (Accelerated Calculus II)
- Math 253A (Accelerated Calculus III)
- Math 301 (Discrete mathematics)
- Math 307 (Linear algebra and differential equations)
- Math 321 (Introduction to advanced mathematics)
- Math 371 (Elementary probability)
- Math 372 (Elementary probability and statistics)
- Math 373 (Elementary statistics)
- Math 454 (Axiomatic set theory)
- Math 455 (Mathematical logic)
- Math 471 (Probability)
- Math 472 (Statistical inference)
- Math 480 (Senior seminar)
- Math 649B (Topics: Logic)
- Math 654 (Introduction to Logic)
- Math 657 (Recursive functions and complexity)
- Math 672 (Stochastic processes)

## 11 Mentoring activity

### 11.1 Mentoring of undergraduate students

1. Alberto J. Evangelista
  - Undergraduate research “Google Distance Between Words”, presented at *Frontiers in Undergraduate Research*, University of Connecticut, 2006.
2. Travis Hee Wai
  - Undergraduate research assistant (funded by NSF grant DMS-0901020), UH-Mānoa, Fall 2010.
3. Daren Kuwaye
  - Spring 2016 MATH 472 term paper “The number of segments on a *Culsia rosea* seed capsule”, published in undergraduate journal *Manoa Horizons*, University of Hawai’i at Mānoa, 2016.
4. Tiffany Eulalio and Bobby-Jake Koki
  - Spring 2017 MATH 373 term paper “Evaluation of Monthly Apartment Rental Prices in Honolulu, HI” published in *Manoa Horizons*, 2017.
5. Ethan Lamb, Clyde Felix, Sun Young Kim, Davin Takahashi
  - Summer 2019: “Vapnik-Chervonenkis dimension and the Separating Words problem”. \$4,037 grant from *Faculty Mentoring Grants for Summer Undergraduate Research and Creative Works* sponsored by the Undergraduate Research Opportunities Program (UROP) in the Office of the Vice Chancellor for Research.
6. Sabrina Hardisty, Guanhong Li, Jacqueline Millard
  - Summer 2020: Supported by “Automatic complexity of Fibonacci arrays”, a \$7,705 grant from *Decision Research Corporation*.

## 11.2 Mentoring of graduate students

### PhD

1. Paul Kim Long V. Nguyen
  - PhD in Mathematics
  - Dissertation title: Complexity of index sets of computable lattices
  - Date of completion: July 3, 2014
  - Subsequent position: University of Hawai'i – Leeward Community College (tenure-track)
2. Soowhan Yoon
  - PhD in Mathematics
  - Dissertation title: Grätzer–Schmidt Theorem in Arithmetical Transfinite Recursion
  - Date of completion: June 26, 2020
  - Subsequent position: Military research, South Korea
3. David J. Webb (expected completion 2022)
4. Sam Birns (expected completion 2022)

### Master

1. Quinn Culver
  - Master of Arts in Mathematics, UH-Mānoa, Master's committee: Bjørn Kjos-Hanssen (chair) and Ralph Freese
  - Title: *Polynomial clone reducibility* (published in *Archive for Mathematical Logic*, 2013)
  - Graduate research assistant (funded by NSF grant DMS-0901020), Spring 2010
  - Subsequent position: PhD program, University of Notre Dame
  - Date of completion: 2010
  - Paper published in *Archive for Mathematical Logic*
2. Kayleigh Hyde
  - Master of Arts in Mathematics, UH-Mānoa, Master's committee: Bjørn Kjos-Hanssen (chair) and Mia Minnes (UCSD)
  - Title: *Nondeterministic finite state complexity*
  - Date of completion: 2013
  - Subsequent position: PhD program, Chapman University
  - Joint paper published in COCOON 2014 and *Electronic J. of Combinatorics*
3. Amirarsalan Pakravan
  - Master of Science in Financial Engineering
  - Title: *Pricing a perpetual option based on nondeterministic automatic complexity*
  - Subsequent position: Student in George Washington University Master of Finance program
  - Date of completion: 2013

- Joint paper published in *Algorithmic Finance*

## 4. Babak Saadat

- Master of Science in Financial Engineering
- Title: *Pricing a perpetual option based on nondeterministic automatic complexity*
- Date of completion: 2013
- Joint paper published in *Algorithmic Finance*

## 5. Malihe Alikhani

- MA in Mathematics
- Title: *American option pricing and optimal stopping for success runs*
- Date of completion: 2014
- Subsequent positions: PhD program, Rutgers; tenure-track Assistant Professor, U. of Pittsburgh 2020
- Joint paper published in *Algorithmic Finance*

## 6. Lei Liu

- MA in Mathematics
- Date of completion: Fall 2017.

## 7. Daylan Kauai Yogi

- MA in Mathematics
- Date of completion: Spring 2018
- Subsequent position: IT specialist, General education office, UH Mānoa

## 8. Jake Fennick

- MA in Mathematics
- Date of completion: Spring 2019
- Subsequent position: IT specialist, OceanIT

**Committee member:**

2012 Erin Caulfield

- Master of Arts in Mathematics, UH-Mānoa, Master’s committee: David A. Ross (chair) and Bjørn Kjos-Hanssen, 2012.

2013 Nematollah Iri

- Master of Science in Electrical Engineering, UH-Mānoa, 2013. Master’s committee consisted of Narayana P. Santhanam (EE), Gürdal Arslan (EE), N. Gaarder (EE), and myself.

2013 Jason M. Rute (Carnegie Mellon University)

- Junior Researcher, 100% funded by NSF grant DMS-0901020, Spring 2013, UH-Mānoa.
- Subsequent position: Postdoc, Penn State, Mathematics.
- Dissertation committee consisted of Jeremy Avigad (CMU Philosophy and Math, chair), James W. Cummings (CMU Math, large cardinals), Richard Statman (CMU Math, lambda calculus), and myself.

2015 Tristan Holmes

- Dissertation committee consisted of Nation (chair), Freese, Manes, myself, and Anders Høst-Madsen.

2016 Jared Mukai

- Dissertation committee consisted of Ramsey (chair), David Ross, Daisuke Takagi, and Lynne Wilkens.

2016 Meysam Asadi

- Dissertation committee consisted of Narayana Prasad Santhanam (chair), myself, Alek Kavcic, Anders Høst-Madsen, and Anthony Kuh.

2018 Alejandro Guillen

- Dissertation committee consisted of Ralph Freese (chair), myself, J.B. Nation, and others.

2018 Joseph Chong

- Master’s in Electrical Engineering. Master’s committee consisted of June Zheng (chair), Galen Sasaki, and myself.

2018 Geuseppe Ayala

- Master’s in Mathematics. Committee chair Ruth Haas.

2019 Changlong Wu

- PhD in Electrical Engineering. Other committee members: June Zhang, Anders Høst-Madsen, Narayana Santhanam (chair)

2019 Yuan Bowen

- PhD in Mathematics at Nanyang Technological University, Singapore (adviser: Guohua Wu)

*11.3 Mentoring of postdocs*

1. Katie Brodhead

- Lecturer, Spring 2008 and Temporary Assistant Professor, Fall 2008 - Spring 2009, UH-Mānoa

2. Cameron E. Freer

- Junior Researcher, 75% funded by NSF grant DMS-0901020, Fall 2010 and Spring 2011, UH-Mānoa

3. Jason M. Rute

- Junior Researcher, 100% funded by NSF grant DMS-0901020, Spring 2013, UH-Mānoa
- PhD from Carnegie Mellon University in Summer 2013; listed here because the position was held right before conferral of PhD

4. Mushfeq Khan

- Temporary Assistant Professor, 2014 – 2018
- PhD from University of Wisconsin, 2014

5. Achilles Beros

- Temporary Assistant Professor, 2015 – 2019
- PhD from University of Wisconsin, 2013

6. Kameryn Williams

- Temporary Assistant Professor, 2018–2021
- PhD from CUNY, 2018

## 12 Talks

### 12.1 Plenary Speaker at Conferences and Workshops

The titles given are the titles of the talks.

- [1] *Permutations of the integers, automorphisms of the Turing degrees, and arithmetically presentable groups*, Higher Recursion Theory and Set Theory, Singapore, June 2019.
- [2] *Constructing a weak subset of a random set*, Association of Symbolic Logic Annual Meeting, New York, NY, May 2019.
- [3] *Planar digraphs for automatic complexity*, Theory and Applications of Models of Computation, Kitakyushu, Japan, March 2019.
- [4] *The number of languages with maximum state complexity*, Theory and Applications of Models of Computation, Kitakyushu, Japan, March 2019.
- [5] *Permutations of the integers induce only the trivial automorphism of the Turing degrees*, Computability theory and foundations of mathematics, Tokyo, Japan, September 2018.
- [6] *Automatic complexity of monotone Boolean functions*, Algebras and lattices in Hawai'i, Honolulu, Hawai'i, May 2018.
- [7] *Permutations of the integers induce only the trivial automorphism of the Turing degrees*, Workshop on Computability Theory, Waterloo, Ontario, June 2018.
- [8] *Shift register fool finite automata*, The 24th International Workshop on Logic, Language, Information and Computation, London, U.K., July 19, 2017.
- [9] *Superposition as memory: unlocking quantum automatic complexity*, Unconventional Computation and Natural Computation, Fayetteville, Arkansas, June 6, 2017.
- [10] *Kolmogorov structure functions for automatic complexity in computational statistics*, The 8th Annual International Conference on Combinatorial Optimization and Applications, Maui, Hawai'i, December 19, 2014. Plenary speaker.
- [11] *Nondeterministic automatic complexity of almost square-free and strongly cube-free words*, 9th International Conference on Computability, Complexity, and Randomness, National University of Singapore, June 13, 2014. Plenary speaker.
- [12] *Brownian motion and Kolmogorov complexity / Teaching asset pricing using GTP*, Workshop on game-theoretic probability and related topics, University of Tokyo, Japan, November 14, 2012. Plenary speaker.
- [13] *Recovering randomness from an asymptotic Hamming distance*, Workshop on Computability Theory, University of San Francisco, CA, March 2011. Plenary speaker.
- [14] *Democracy is the best form of randomness extraction*, 5th Conference of Logic, Computability, and Randomness, Notre Dame, IN, May 2010. Plenary speaker.
- [15] *Democracy is the best form of randomness extraction*, Annual Meeting, Association of Symbolic Logic, Washington, DC, March 2010. Plenary speaker.
- [16] *Feeble subsets*, 4th Conference on Logic, Computability and Randomness, Marseille, France, July 1, 2009. Plenary speaker.
- [17] *Members of random closed sets*, Effective Randomness NSF Focused Research Group Workshop, University of Wisconsin-Madison, May 30, 2009. Plenary speaker.
- [18] *Birth-death processes, bushy trees, and a law of weak subsets*, Computability, Combinatorics, and Reverse Mathematics, Banff, Canada, December 10, 2008. Plenary speaker.
- [19] *Effective Fourier dimension*, 3rd Conference on Logic, Computability, and Randomness, Nanjing, China, May 19, 2008. Plenary speaker.
- [20] *Infinite subsets of random sets*, Effective Randomness NSF Focused Research Group Workshop, University of Chicago, September 15, 2007. Plenary speaker.
- [21] *Brownian motion and Kolmogorov complexity*, Summer Meeting ("Logic Colloquium"), Association of Symbolic Logic, Wroclaw, Poland, July 14, 2007. Plenary speaker.
- [22] *Eventually different functions*, Kolmogorov Complexity and Applications, Dagstuhl, Germany, February 2, 2006. Plenary speaker.
- [23] *Positive-measure domination*, Program on Computational Prospects of Infinity, National University of Singapore, July 29, 2005. Plenary speaker.
- [24] *A rigid cone in the truth-table degrees with jump*, Workshop on Computability and Logic, Heidelberg, Germany, June 25, 2003. Plenary speaker.



## 12.2 Special session talks

The titles given are the titles of the special sessions.

- [1] *Computability theory and its applications*, AMS Sectional Meeting, Notre Dame, IN, October 2010.
- [2] *Algorithmic randomness*, Computability in Europe, Heidelberg, Germany, July 20, 2009.
- [3] *Computability*, 10th Asian Logic Conference, Kobe, Japan, September 5, 2008.
- [4] *Computability theory and computable mathematics*, Annual Meeting, Association of Symbolic Logic, Irvine, California, March 29, 2008.
- [5] *Computability theory*, Joint Meeting, American Mathematical Society and New Zealand Mathematical Society, Wellington, New Zealand, December 15, 2007.
- [6] *Computability and randomness*, Theory and applications of models of computation, Fudan University, Shanghai, China, May 24, 2007.
- [7] *Computability theory*, Annual Meeting, Association of Symbolic Logic, Gainesville, Florida, March 10, 2007.
- [8] *Computability theory in honor of Manuel Lerman's retirement*, Sectional Meeting, American Mathematical Society, Storrs, Connecticut, October 27, 2006.
- [9] *Computability theory*, European Summer Meeting ("Logic Colloquium"), Association of Symbolic Logic, Nijmegen, Netherlands, July 28, 2006.
- [10] *Model theory and computability*, Sectional Meeting, American Mathematical Society, Notre Dame, April 9, 2006.
- [11] *Computability and randomness*, Annual Meeting, Association of Symbolic Logic, Stanford, California, March 21, 2005.

## 12.3 Other presentations

- [1] *Linear feedback shift registers fool finite automata*, Society for Industrial and Applied Mathematics (SIAM) Conference on Discrete Mathematics, Atlanta, Georgia, June 9, 2016. Poster.
- [2] *Obligations in a context*, North American Annual Meeting of the Association of Symbolic Logic, Storrs, Connecticut, May 23, 2016. Contributed talk, 20 minutes.
- [3] *Permutations of the integers do not induce nontrivial automorphisms of the Turing degrees*, Computability, Complexity and Randomness, Heidelberg, Germany, June 25, 2015. Contributed talk, 30 minutes.
- [4] *Kolmogorov structure functions for automatic complexity*, Varieties of Algorithmic Information, Heidelberg, Germany, June 16, 2015. Contributed talk, 45 minutes.
- [5] *Automatic complexity*, College of Natural Sciences Dean's office Brown bag lunch talks series, Honolulu, Hawai'i, April 30, 2015.
- [6] *Numberings and randomness*, Computability in Europe, Heidelberg, Germany, July 23, 2009. Contributed talk on a paper accepted for the conference proceedings.
- [7] *The strength of the Grätzer-Schmidt theorem*, Computability in Europe, Heidelberg, Germany, July 21, 2009. Contributed talk on a paper accepted for the conference proceedings.
- [8] *The law of the iterated logarithm for algorithmically random Brownian motion*, Logical Foundations of Computer Science, CUNY Graduate Center, New York City, June 5, 2007. Contributed talk on a paper accepted for the conference proceedings.
- [9] *Some computably random series of functions*, Workshop on Harmonic and Geometric Analysis and Applications, Baton Rouge, Louisiana, January 4, 2007. Invited talk.
- [10] *Almost everywhere domination and K-triviality*, Computability in Europe, Amsterdam, Netherlands, June 12, 2005. Contributed talk.

## 12.4 Departmental seminars

The list does not include talks in seminars where I was one of the principal organizers; expository talks given as part of collaborative seminar series; or talks given prior to submitting my doctoral dissertation.

- [1] *Kolmogorov structure functions for automatic complexity*, Probability Seminar, University of Washington, Seattle, June 1, 2015. 50 minute lecture.
- [2] *Nondeterministic finite state complexity*, Logic Seminar, Universitetet i Oslo, September 5, 2013. three 2-hour lectures, three separate weeks.
- [3] *Recovering randomness from an asymptotic Hamming distance*, Berkeley Logic Colloquium, University of California, Berkeley, March 11, 2011.
- [4] *Infinite subsets of random sets of natural numbers*, Probability seminar, University of Washington, December 5, 2008.

- [5] *Asarin's theorem on incompressible random walk*, Recursion theory seminar, University of California, Berkeley, October 24, 2008.
- [6] *Algorithmic dimension of points visited by Brownian motion*, analysis seminar, University of Hawai'i at Mānoa, October 10, 2007.
- [7] *Percolation limit sets and other random closed sets*, Logic seminar, Nanjing University, May 29, 2007.
- [8] *Brownian motion and Kolmogorov complexity*, public talk, Technische Universität Darmstadt, Germany, February 27, 2007.
- [9] *Brownian motion and Kolmogorov complexity*, Logic seminar, George Washington University, January 29, 2007.
- [10] Southern Wisconsin Logic Colloquium, University of Wisconsin, Madison, October 7, 2006.
- [11] *Schnorr random paths of Brownian motion*, Logic seminar, Pennsylvania State University, University Park, October 3, 2006.
- [12] *Computably random paths of Brownian motion*, Logic seminar, University of Waterloo, September 22, 2006.
- [13] *Complex oscillations and the law of the iterated logarithm*, Logic seminar, Cornell University, September 6, 2006.
- [14] *Complex oscillations and the law of the iterated logarithm*, Oberseminar, Mathematische Logik und Theoretische Informatik, University of Heidelberg, Germany, July 18, 2006.
- [15] *Automatic meaning discovery using Google*,  $\Sigma$  seminar, Department of Mathematics, University of Connecticut, February 22, 2006.
- [16] *Almost everywhere domination and K-triviality*, Oberseminar, Mathematische Logik und Theoretische Informatik, University of Heidelberg, Germany, June 14, 2005.
- [17] Logic seminar, University of Notre Dame, April 12, 2005.
- [18] *Weak recursive degrees*, Logic seminar, Cornell University, March 9, 2005.
- [19] *Almost everywhere domination*, Logic seminar, Cornell University, March 8, 2005.
- [20] *Eventually different functions*, Connecticut logic seminar, Wesleyan University, October 4, 2004.
- [21] *Reverse mathematics and diagonally non-recursive functions*, Connecticut logic seminar, Wesleyan University, March 1, 2004.
- [22] *Reverse mathematics and diagonally non-recursive functions*, Oberseminar, Mathematische Logik und Theoretische Informatik, University of Heidelberg, Germany, December 9, 2003.
- [23] *Initial segments of the Turing degrees with a view toward automorphisms*, Oberseminar, Mathematische Logik und Theoretische Informatik, University of Heidelberg, Germany, September 24, 2002.

## 13 Media

- ThinkTech Hawai'i featured the conference I organized in 2016: <https://youtu.be/1kTtB1Ybk9s>
- Interviewed by Jay Fidell for ThinkTech Hawai'i in 2018: [https://youtu.be/HJ\\_M0dsTu1M](https://youtu.be/HJ_M0dsTu1M)