

Curriculum Vitae  
Stewart N. Ethier

**Contact information:**

Department of Mathematics  
University of Utah  
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<http://www.math.utah.edu/~ethier/>

**Personal:**

Place and date of birth: Milwaukee, Aug. 2, 1948. Citizenship: USA. Marital status: married.

**Education:**

B.A. 1970, University of Wisconsin–Madison, major in mathematics  
M.A. 1971, University of Wisconsin–Madison, mathematics  
Ph.D. 1975, University of Wisconsin–Madison, mathematics; advisor: Thomas G. Kurtz

**Academic rank:**

1975–1979. Michigan State University, Department of Statistics and Probability, Assistant Professor  
1979–1984. Michigan State University, Department of Statistics and Probability, Associate Professor  
1984–2016. University of Utah, Department of Mathematics, Professor  
2016–present. University of Utah, Department of Mathematics, Professor Emeritus

**Visiting positions:**

1975–1976. Courant Institute of Math. Sciences, New York University, Visiting Member (Sep.–Jul.)  
1982. University of Wisconsin–Madison, Department of Mathematics, Honorary Fellow (Jul.–Dec.)  
1983. Monash University, Department of Mathematics, Visiting Lecturer (Jan.–Aug.)  
1990. Tokyo Institute of Technology, Department of Applied Physics, Guest Professor (Sep.–Dec.)  
1991. University of Wisconsin–Madison, Department of Mathematics, Honorary Fellow (Jan.–Mar.)  
1991. Monash University, Department of Mathematics, Visitor (Apr.–Aug.)  
1997. Tokyo Institute of Technology, Department of Applied Physics, Guest Professor (Sep.–Dec.)  
1998. Monash University, Department of Mathematics, Visitor (Feb.–May)  
2007–2008. University of Nevada, Las Vegas, Center for Gaming Research, Visiting Fellow (Dec.–Jan.)  
2011–2012. Yeungnam University, Department of Statistics, Visiting Professor (Jul.–Jun.)

**Research interests:**

Applied probability, mathematical population genetics, game theory, Parrondo’s paradox.

**Membership:**

Institute of Mathematical Statistics (since 1976).  
American Mathematical Society (since 2018).

## Honors:

Fellow of Institute of Mathematical Statistics. Elected in 1993 “For fundamental contributions to the theory of weak convergence and diffusions, and the development of measure-valued diffusions in population genetics.”

Fellow of the Center for Gaming Research, University of Nevada Las Vegas, 2007.

Fellow of Korean Brainpool Program, sponsored by the Korean Federation of Science and Technology Societies, 2011–2012.

## Books:

1. (with T. G. Kurtz) *Markov Processes: Characterization and Convergence*. Wiley Series in Probability and Mathematical Statistics. Wiley, New York, 1986. Paperback reprint, 2005. 534 pp.

2. *The Doctrine of Chances: Probabilistic Aspects of Gambling*. Probability and Its Applications Series. Springer, Berlin, 2010. 816 pp. <http://www.math.utah.edu/~ethier/DoC.html>

## Books edited:

1. (with W. R. Eadington) *Optimal Play: Mathematical Studies of Games and Gambling*. Institute for the Study of Gambling and Commercial Gaming, University of Nevada, Reno, 2007. 550 pp. <http://www.math.utah.edu/~ethier/OP.html>.

2. (with J. Feng and R. H. Stockbridge) *Markov Processes and Related Topics: A Festschrift for Thomas G. Kurtz*. IMS Collections 4, Institute of Mathematical Statistics, Beachwood, OH, 2008. 324 pp.

## Research papers:

1. A class of degenerate diffusion processes occurring in population genetics. *Comm. Pure Appl. Math.* **29** (1976), 483–493.

2. (with M. F. Norman) Error estimate for the diffusion approximation of the Wright–Fisher model. *Proc. Natl. Acad. Sci. USA* **74** (1977), 5096–5098.

3. Differentiability preserving properties of Markov semigroups associated with one-dimensional diffusions. *Z. Wahr. verw. Gebiete* **45** (1978), 225–238.

4. A limit theorem for two-locus diffusion models in population genetics. *J. Appl. Probab.* **16** (1979), 402–408.

5. Limit theorems for absorption times of genetic models. *Ann. Probab.* **7** (1979), 622–638.

6. (with T. Nagylaki) Diffusion approximations of Markov chains with two time scales and applications to population genetics. *Adv. Appl. Probab.* **12** (1980), 14–49.

7. A class of infinite-dimensional diffusions occurring in population genetics. *Indiana Univ. Math. J.* **30** (1981), 925–935.

8. (with T. G. Kurtz) The infinitely-many-neutral-alleles diffusion model. *Adv. Appl. Probab.* **13** (1981), 429–452.

9. On the definition of the house advantage. In *The Gambling Papers: Proceedings of the Fifth National Conference on Gambling and Risk Taking, Vol. XIII. Quantitative Analysis of Gambling: Stock Markets and Other Games*. W. R. Eadington, ed. Univ. of Nevada, Reno, 1982, pp. 46–67.

10. Testing for favorable numbers on a roulette wheel. *J. Amer. Statist. Assoc.* **77** (1982), 660–665.

11. (with S. Tavaré) The proportional bettor’s return on investment. *J. Appl. Probab.* **20** (1983), 563–573.

12. (with S. E. Hodge) Identity-by-descent analysis of sibship configurations. *Amer. J. Med. Genet.* **22** (1985), 263–272.

13. (with R. C. Griffiths) The infinitely-many-sites model as a measure-valued diffusion. *Ann. Probab.* **15** (1987), 515–545.

14. (with T. G. Kurtz) The infinitely-many-alleles model with selection as a measure-valued diffusion. *Springer–Verlag Lecture Notes in Biomathematics* **70** (1987), 72–86.

15. The probability of winning the VFL Grand Final. *Function* **11** (1987), 73–79.

16. Improving on bold play at craps. *Operations Research* **35** (1987), 814–819.
17. (with T. Nagylaki) Diffusion approximations of Markov chains with two time scales and applications to population genetics, II. *Adv. Appl. Probab.* **20** (1988), 525–545.
18. The proportional bettor’s fortune. In *Gambling Research: Proceedings of the Seventh International Conference on Gambling and Risk Taking* **4**. W. R. Eadington, ed. Univ. of Nevada, Reno, 1988, pp. 375–383.
19. (with T. Nagylaki) Diffusion approximations of the two-locus Wright–Fisher model. *J. Math. Biol.* **27** (1989), 17–28.
20. The infinitely-many-neutral-alleles diffusion model with ages. *Adv. Appl. Probab.* **22** (1990), 1–24.
21. The distribution of the frequencies of age-ordered alleles in a diffusion model. *Adv. Appl. Probab.* **22** (1990), 519–532.
22. (with R. C. Griffiths) The neutral two-locus model as a measure-valued diffusion. *Adv. Appl. Probab.* **22** (1990), 773–786.
23. (with R. C. Griffiths) On the two-locus sampling distribution. *J. Math. Biol.* **29** (1990), 131–159.
24. (with R. C. Griffiths) Harmonic measure for random genetic drift. In *Diffusion Processes and Related Problems in Analysis* **1**. M. A. Pinsky, ed. Birkhäuser, Boston, 1990, pp. 73–81.
25. (with T. G. Kurtz) On the stationary distribution of the neutral diffusion model in population genetics. *Ann. Appl. Probab.* **2** (1992), 24–35.
26. Equivalence of two descriptions of the ages of alleles. *J. Appl. Probab.* **29** (1992), 185–189.
27. (with W. J. Ewens, R. C. Griffiths, S. A. Wilcox, and J. A. M. Graves) Statistical analysis of in situ hybridization data: derivation and use of the zmax test. *Genomics* **12** (1992), 675–682.
28. Eigenstructure of the infinitely-many-neutral-alleles diffusion model. *J. Appl. Probab.* **29** (1992), 487–498.
29. (with R. C. Griffiths) The transition function of a measure-valued branching diffusion with immigration. In *Stochastic Processes: A Festschrift in Honour of Gopinath Kallianpur*. S. Cambanis, J. K. Ghosh, R. L. Karandikar, and P. K. Sen, eds. Springer–Verlag, New York, 1993, pp. 71–79.
30. (with T. G. Kurtz) Fleming–Viot processes in population genetics. *SIAM J. Control Optim.* **31** (1993), 345–386.
31. (with R. C. Griffiths) The transition function of a Fleming–Viot process. *Ann. Probab.* **21** (1993), 1571–1590.
32. (with T. Shiga) Neutral allelic genealogy. In *Measure-Valued Processes, Stochastic Partial Differential Equations, and Interacting Systems*. D. A. Dawson, ed. CRM Proceedings and Lecture Notes, American Mathematical Society, Providence, 1994, pp. 89–97.
33. (with T. G. Kurtz) Convergence to Fleming–Viot processes in the weak atomic topology. *Stochastic Processes Appl.* **54** (1994), 1–27.
34. (with S. M. Krone) Comparing Fleming–Viot and Dawson–Watanabe processes. *Stochastic Processes Appl.* **60** (1995), 171–190.
35. A gambling system and a Markov chain. *Ann. Appl. Probab.* **6** (1996), 1248–1259.
36. On the normal-selection model. In *Progress in Population Genetics and Human Evolution*. P. Donnelly and S. Tavaré, eds. IMA Volumes in Math. and its Appl. **87**. Springer, New York, 1997, pp. 309–320.
37. (with T. G. Kurtz) Coupling and ergodic theorems for Fleming–Viot processes. *Ann. Probab.* **26** (1998), 533–561.
38. An optional stopping theorem for nonadapted martingales. *Statistics & Probab. Letters* **39** (1998), 283–288.
39. Thackeray and the Belgian progression. *Math. Scientist* **24** (1999), 1–23.
40. Analysis of a gambling system. In *Finding the Edge: Mathematical Analysis of Casino Games*. O. Vancura, W. R. Eadington, and J. A. Cornelius, eds. Univ. of Nevada, Reno, 2000, pp. 3–18.
41. (with A. D. Barbour and R. C. Griffiths) A transition function expansion for a diffusion model with selection. *Ann. Appl. Probab.* **10** (2000), 123–162.
42. (with T. Shiga) A Fleming–Viot process with unbounded selection. *J. Math. Kyoto Univ.* **40** (2000), 337–361.

43. (with T. Shiga) A Fleming–Viot process with unbounded selection, II. In *Markov Processes and Controlled Markov Chains*. Z. Hou, J. A. Filar, A. Chen, eds. Kluwer, 2001, pp. 303–320.
44. (with D. Khoshnevisan) Bounds on gambler’s ruin probabilities in terms of moments. *Methodology Comput. Appl. Probab.* **4** (2002), 55–68.
45. (with S. Wang) A generalized likelihood ratio test to identify differentially expressed genes from microarray data. *Bioinformatics* **20** (2004), 100–104.
46. The Kelly system maximizes median fortune. *J. Appl. Probab.* **41** (2004), 1230–1236.
47. (with D. A. Levin) On the fundamental theorem of card counting with application to the game of trente et quarante. *Adv. in Appl. Probab.* **37** (2005), 90–107.
48. Comment: “Basic strategy for card counters.” In *Optimal Play: Mathematical Studies of Games and Gambling*. S. N. Ethier and W. R. Eadington, eds. Institute for the Study of Gambling and Commercial Gaming, Univ. of Nevada, Reno, 2007, pp. 67–71.
49. Faro: From soda to hock. In *Optimal Play: Mathematical Studies of Games and Gambling*. S. N. Ethier and W. R. Eadington, eds. Institute for the Study of Gambling and Commercial Gaming, Univ. of Nevada, Reno, 2007, pp. 225–235.
50. A Bayesian analysis of the shooter’s hand at craps. In *Optimal Play: Mathematical Studies of Games and Gambling*. S. N. Ethier and W. R. Eadington, eds. Institute for the Study of Gambling and Commercial Gaming, Univ. of Nevada, Reno, 2007, pp. 311–322.
51. Markov chains and Parrondo’s paradox. In *Optimal Play: Mathematical Studies of Games and Gambling*. S. N. Ethier and W. R. Eadington, eds. Institute for the Study of Gambling and Commercial Gaming, Univ. of Nevada, Reno, 2007, pp. 493–506.
52. Optimal play at subfair compound games. In *Optimal Play: Mathematical Studies of Games and Gambling*. S. N. Ethier and W. R. Eadington, eds. Institute for the Study of Gambling and Commercial Gaming, Univ. of Nevada, Reno, 2007, pp. 525–540.
53. Absorption time distribution for an asymmetric random walk. In *Markov Processes and Related Topics: A Festschrift for Thomas G. Kurtz*. S. N. Ethier, J. Feng, and R. H. Stockbridge, eds. IMS Collections **4**, Institute of Mathematical Statistics, Beachwood, OH, 2008, pp. 31–40.
54. (with M. Estafanous) The duration of play in games of chance with win-or-lose outcomes and general payoffs. *Math. Scientist* **34** (2009), 99–106.
55. (with J. Lee) Limit theorems for Parrondo’s paradox. *Electron. J. Probab.* **14** (2009), 1827–1862. <http://arxiv.org/abs/0902.2368>.
56. (with J. Lee) A Markovian slot machine and Parrondo’s paradox. *Ann. Appl. Probab.* **20** (2010), 1098–1125. <http://arxiv.org/abs/0906.0792>.
57. (with F. M. Hoppe) A world record in Atlantic City and the length of the shooter’s hand at craps. *Math. Intelligencer* **32-4** (2010), 44–48. <http://arxiv.org/abs/0906.1545>.
58. (with J. Lee) A discrete dynamical system for the greedy strategy at collective Parrondo games. *Dynamical Systems* **26** (2011) 410–424. <http://arxiv.org/abs/1011.1773>.
59. (with J. Lee) Parrondo’s paradox via redistribution of wealth. *Electron. J. Probab.* **17-20** (2012) 1–21. <http://arxiv.org/abs/1109.4454>.
60. (with J. Lee) Parrondo games with spatial dependence. *Fluct. Noise Lett.* **11-1250004** (2012) 1–22. <http://arxiv.org/abs/1202.2609>.
61. (with J. Lee) Parrondo games with spatial dependence, II. *Fluct. Noise Lett.* **11-1250030** (2012) 1–18. <http://arxiv.org/abs/1206.6195>.
62. Counting toroidal binary arrays. *J. Integer Seq.* **16-13.4.7** (2013) 1–8. <http://arxiv.org/abs/1301.2352>.
63. (with J. Lee) Parrondo games with spatial dependence and a related spin system. *Markov Process. Related Fields* **19** (2013) 163–194. <http://arxiv.org/abs/1203.0818>.
64. (with J. Lee) Parrondo games with spatial dependence and a related spin system, II. *Markov Process. Related Fields* **19** (2013) 667–692. <http://arxiv.org/abs/1206.6567>.
65. (with C. Gámez) A game-theoretic analysis of baccara chemin de fer. *Games* **4** (2013) 711–737. <http://arxiv.org/abs/1305.5468>.

66. A property of Petrov's diffusion. *Electron. Commun. Probab.* **19** (2014) 1–4. <http://arxiv.org/abs/1406.5198>.
67. (with J. Lee) On the three-person game *baccara banque*. *Games* **6** (2015) 57–78. <http://arxiv.org/abs/1410.7052>.
68. (with J. Lee) Counting toroidal binary arrays, II. *J. Integer Seq.* **18** (2015) (15.8.3) 1–12. <http://arxiv.org/abs/1502.03792>.
69. (with J. Lee) The evolution of the game of baccarat. *J. Gambling Business Econ.* **9** (2015) (2) 1–13. <http://arxiv.org/abs/1308.1481>.
70. (with J. Lee) Parrondo games with spatial dependence, III. *Fluct. and Noise Lett.* **14** (2015) (1550039) 1–20. <http://arxiv.org/abs/1412.7699>.
71. (with J. Lee) Parrondo games with two-dimensional spatial dependence. *Fluct. and Noise Lett.* **16** (2017) (1750005) 1–23. <http://arxiv.org/abs/1510.06947>.
72. (with C. Costantini, P. De Blasi, M. Ruggiero, and D. Spanò) Wright–Fisher construction of the two-parameter Poisson–Dirichlet diffusion. *Ann. Appl. Probab.* **27** (2017) 1923–1950. <http://arxiv.org/abs/1601.06064>.
73. (with J. Lee) The flashing Brownian ratchet and Parrondo's paradox. *Royal Society Open Science* **5** (2018) (171685) 1–13. <https://arxiv.org/abs/1710.05295>.
74. (with J. Lee) The tilted flashing Brownian ratchet. *Fluct. and Noise Lett.* **18** (2019) (1950005) 1–19. <http://arxiv.org/abs/1807.06226>.
75. (with J. J. Kim and J. Lee) Optimal conditional expectation at the video poker game Jacks or Better. *UNLV Gaming Research & Review J.* **23** (2019) (1) 1–18. <http://arxiv.org/abs/1602.04171>.
76. (with J. Lee) How strong can the Parrondo effect be? *J. Appl. Probab.* **56** (2019), 1198–1216. <https://arxiv.org/abs/1901.08257>.
77. (with J. Lee) Snackjack: A toy model of blackjack. *UNLV Gaming Research & Review J.* **24** (2020), 49–82. <https://arxiv.org/abs/1906.01220>.
78. (with J. Lee) How strong can the Parrondo effect be? II. In *Stochastic Processes and Functional Analysis: New Perspectives*. R.J. Swift, A. Krinik, J.M. Switkes, and J.H. Park, eds. *Contemporary Mathematics* **774**. American Mathematical Society, 2021, 25–35. <https://arxiv.org/abs/2001.00291>.
79. (with P. Diaconis) Gambler's ruin and the ICM. *Statistical Science*, to appear. <https://arxiv.org/abs/2011.07610>.
80. Bertrand's analysis of baccarat. <https://arxiv.org/abs/2107.00198>

All papers were refereed except 9, 14, 18, and 48.

All joint works used alphabetical ordering of authors except papers 27 and 45 and edited book 1.

#### Non-research papers:

1. Contributor to “Tributes to the International Conference on Gambling and Risk-Taking.” *UNLV Gaming Research & Review J.* **16** (2012), 43–44.
2. (with F. M. Hoppe) Teaching a university course on the mathematics of gambling. *UNLV Gaming Research & Review J.* **24** (2020), 1–35. <https://arxiv.org/abs/1911.03008>.

#### Grants:

National Science Foundation: 15 years during 1978–95.  
 Simons Foundation: 2011–21.

#### Invited lecture series:

“Stochastic models in population genetics,” Tokyo Institute of Technology, December 1997

#### Invited conference talks:

AMS Special Session on Probability Theory Inspired by Applications (New York) April 1979

IMS session on Markov Processes and Population Genetics (East Lansing) June 1979  
 Second Midwest Probability Colloquium (Evanston) October 1980  
 U.S.–Japan Seminar on Stochastic Methods in Biology (Nagoya, Japan) July 1985  
 AMS Special Session on Random Fields, Random Measures and Applications (Logan) October 1986  
 Internat. Workshop on Diffusion Approximations and Related Topics (Laxenburg, Austria) June 1987  
 IMS session on Probability Applicable to Biology (Madison) May 1988  
 AMS Special Session on Markov Processes and Stochastic Analysis (Louisville) January 1990  
 Symp. on Stochastic Models in the Physical and Biological Sciences (Lake Yamanaka, Japan) Nov. 1990  
 Workshop on Superprocesses and Interacting Systems (Montréal, Canada) October 1992  
 AMS Special Session on Stochastic Processes in Population Genetics (Salt Lake City) April 1993  
 Workshop on Approx. and Numerical Methods Related to Diffusion Processes (Pittsburgh) Oct. 1993  
 IMA Workshop on Mathematical Population Genetics (Minneapolis) January 1994  
 Conference on Measure-Valued Branching and Superprocesses (Ramat Gan, Israel) May 1995  
 AMS–IMU Special Session on Probability (Jerusalem, Israel) May 1995  
 ORSA/TIMS Applied Probability Conference; session on gambling and finance (Atlanta) June 1995  
 Conference on Branching Processes (Oberwolfach, Germany) December 1995  
 Symposium on Stochastic Processes in Biology (Yokohama, Japan) January 1997  
 Workshop on Stochastics in Population Genetics and Tree Reconst. (Frankfurt, Germany) Nov. 1997  
 Workshop on Interactive Measure-Valued Processes (Toronto, Canada) March 1999  
 Internat. Workshop on Markov Processes and Controlled Markov Chains (Changsha, China) Aug. 1999  
 Spring Probability Meeting (Tokyo, Japan) March 2005  
 Cincinnati Symposium on Probability Theory and Applications (Cincinnati) March 2009  
 Sixth Korean Mathematical Society Probability Workshop (Seoul, South Korea) June 2012  
 AMS Special Session on Markov Chains, Markov Processes and Applications (San Diego) January 2018  
 AMS Special Session on Celebrating M. M. Rao’s 90th Birthday (Riverside) Nov. 2019  
 AMS Special Session on Transient Probabilities of Random Processes, etc. (Virtual) Apr. 2022

**Contributed conference talks:**

AMS Annual Meeting (Washington, D.C.) January 1975  
 CBMS–NSF Conference (Athens, GA) December 1977  
 CBMS–NSF Conference (Missoula) June 1979  
 AMS Annual Meeting (San Antonio) January 1980  
 AMS Meeting (Reno) April 1981  
 Fifth National Conference on Gambling (Stateline) October 1981  
 Sixth National Conference on Gambling and Risk Taking (Atlantic City) December 1984  
 MAA Meeting, Intermountain Section (Ogden) April 1985  
 Seventh International Conference on Gambling and Risk Taking (Reno) August 1987  
 Twenty-fifth Anniversary Conference for Van Vleck Hall (Madison) May 1988  
 Workshop on Infinite-Dimensional Markov Processes (Ithaca) May 1989  
 18th Conference on Stochastic Processes and their Applications (Madison) June 1989  
 Conference on Diffusion Processes and Related Topics in Analysis (Evanston) October 1989  
 Workshop on Stochastic Systems (Canberra, Australia) May 1991  
 Seminar on Stochastic Processes (Seattle) March 1992  
 Ninth International Conference on Gambling and Risk Taking (Las Vegas) June 1994  
 MAA Meeting, Intermountain Section (Pocatello) April 1995  
 MAA Meeting, Intermountain Section (Logan) April 1997  
 Wisconsin Mathematics Ph.D. Centennial Conference (Madison) May 1997  
 10th International Conference on Gambling and Risk Taking (Montréal, Canada) June 1997  
 11th International Conference on Gambling and Risk Taking (Las Vegas) June 2000  
 12th International Conference on Gambling and Risk Taking (Vancouver, Canada) May 2003  
 MAA Meeting, Intermountain Section (Pocatello) March 2005  
 13th International Conference on Gambling and Risk Taking (Stateline) May 2006 (3 talks)

Markov Processes and Related Topics (Madison) July 2006  
MAA Meeting, Intermountain Section (Salt Lake City) March 2007  
14th International Conference on Gambling and Risk Taking (Stateline) May 2009 (2 talks)  
Eighth World Congress in Probability and Statistics (Istanbul, Turkey) July 2012  
15th International Conference on Gambling and Risk Taking (Las Vegas) May 2013  
Ninth Spain-Italy-Netherlands Meeting on Game Theory [SING9] (Vigo, Spain) July 2013  
10th Spain-Italy-Netherlands Meeting on Game Theory [SING10] (Krakow, Poland) July 2014  
38th Conference on Stochastic Processes and their Applications (Oxford, UK) July 2015  
16th International Conference on Gambling and Risk Taking (Las Vegas) June 2016  
Ninth World Congress in Probability and Statistics (Toronto, Canada) July 2016  
17th International Conference on Gambling and Risk Taking (Las Vegas) May 2019 (2 talks)  
20th INFORMS Applied Probability Society Conference (Brisbane, Australia) July 2019  
International Conference on Game Theory and Applications (St. Petersburg, Russia, Virtual) June 2022

#### **Ph.D. students:**

Gilles Blum (1982) “Limit theorems for discrete parameter random evolutions,” Michigan State University  
Ming He (1993) “Generators, metric structures, and approximations for measure-valued stochastic processes,” University of Utah  
Sung Chan Choi (2017) “Analysis of spatial Parrondo games with spatially dependent game  $A$ ,” University of Utah

#### **Masters students:**

Craig Johnson (1997) “Simulation of the Belgian progression and Oscar’s system,” University of Utah  
Song Wang (2003) “A generalized likelihood ratio test to identify differentially expressed genes from microarray data,” University of Utah  
Hilary Goss (2010) “Statistical methods in network intrusion detection,” University of Utah  
Carlos Gamez (2010) “Analysis of chemin-de-fer with no replacement,” University of Utah  
Julie Billings (2010) “Fold or raise all-in at one-card poker,” University of Utah  
Sung Chan Choi (2011) “Counterterrorism analysis using cooperative game theory,” University of Utah  
Mi Ryu (2014) “Player’s strategy at baccarat chemin de fer,” University of Utah  
Mathew Arndt (2016) “Improving decision making in no limit Texas holdem — A game theory and data mining analysis,” University of Utah

#### **REU students:**

Stephen Jensen (2001) “Optimal drawing strategy for Deuces Wild video poker,” University of Utah  
Nathan Simonsen (2014) “An analysis of Hold’em Roulette,” University of Utah

#### **Classes taught 2005–2016:**

Summer 2005 class: REU program (Mathematics of Games of Chance)  
Fall 2005 class: Math 5010 (Introduction to Probability)  
Spring 2006 classes: Math 5030 (Actuarial Mathematics), Math 5080 (Statistical Inference I)  
Fall 2006 classes: Math 5040 (Stochastic Processes and Simulation I), Math 6010 (Linear Models)  
Spring 2007 classes: Math 5050 (Stochastic Processes and Simulation II), Math 6020 (Multilinear Models)  
Fall 2007 classes: Math 5010 (Introduction to Probability), Math 6040 (Mathematical Probability)  
Spring 2008 classes: Math 5030 (Actuarial Mathematics), Math 6070 (Mathematical Statistics)  
Fall 2008 classes: Math 5010 (Introduction to Probability), Math 5080 (Statistical Inference I)  
Spring 2009 classes: Math 5030 (Actuarial Mathematics), Math 5750 (Game Theory)  
Fall 2009 classes: Math 5040 (Stochastic Proc. and Simulation I), Math 6040 (Mathematical Probability)

Spring 2010 classes: Math 5050 (Stochastic Proc. and Simulation II), Math 5080 (Statistical Inference I)  
 Fall 2010 classes: Math 5010 (Introduction to Probability), Math 6010 (Linear Models)  
 Spring 2011 classes: Math 5750 (Game Theory), Math 6020 (Multilinear Models)  
 Spring 2012 class: Dept. of Statistics, Yeungnam University, (graduate level) Stochastic Models  
 Fall 2012 classes: Math 5010 (Intro. to Probability), Math 5040 (Stochastic Proc. and Simulation I)  
 Spring 2013 classes: Math 5050 (Stochastic Proc. and Simulation II), Math 5750 (Game Theory)  
 Fall 2013 classes: Math 5010 (Intro. to Probability), Math 5080 (Statistical Inference I)  
 Spring 2014 classes: Math 5090 (Statistical Inference II), Math 5750 (Game Theory)  
 Fall 2014 classes: Math 5040 (Stochastic Proc. and Simulation I), Math 5090 (Statistical Inference II)  
 Spring 2015 classes: Math 5050 (Stochastic Proc. and Simulation II), Math 5750 (Game Theory)  
 Fall 2015 classes: Math 5080 (Statistical Inference I), Math 6040 (Mathematical Probability)  
 Spring 2016 classes: Math 5750 (Game Theory), Math 6070 (Mathematical Statistics)

**Service:**

Associate Editor for *Annals of Applied Probability*, 1991–96.

Reviewer for *Mathematical Reviews*. (40 reviews since 1983.)

Refereeing since 2008. (2008: *J. Appl. Probab.*, *Statist. Probab. Lett.*, *Theoret. Population Biol.* 2009: *J. Appl. Probab.* (2), *Stoch. Processes Appl.* 2010: *Statist. Probab. Lett.* 2011: *J. Appl. Probab.*, *Amer. Math. Monthly*, *Internat. Gambling Studies*. 2012: *Euro. J. Finance*, *Stoch. Processes Appl.*, *Phys. Lett. A*, *Electron. J. Probab.* 2013: *UNLV Gaming Res. & Rev. J.* 2014: *Colombian J. Statist.*, *Discrete Appl. Math.*, *Theoret. Population Biol.* 2016: *Math. Problems Engineering*, *Electron. J. Probab.* 2017: *J. Statist. Phys.* 2018: *Markov Processes Rel. Fields*, *Fluct. Noise Lett.* 2019: *Comm. Nonlinear Sci. Numerical Simulation*, *Physica A*. 2020: *Physica A*. (2). 2021: *Amer. Math. Monthly*, *Statist. Sci.*, *Science and Engineering J.*

Co-organizer, Special Session on Stochastic Processes in Population Genetics, Salt Lake City AMS meeting, April 1993.

Local organizer, Third International Probability Symposium, Park City, July 1997.

Co-organizer, Special Session on Ergodic Theory of Stochastic Processes, Salt Lake City AMS meeting, September 1999.

Co-organizer, Markov Processes and Related Topics, A conference in honor of Tom Kurtz on his 65th birthday, Madison, July 2006.

Member of NSF–CBMS conference review panel, Washington, D.C., June 1993, June 1996.

University of Utah Academic Senate, 2002–04.

University Humanities Area Committee, 2006–09.

University Statistics Committee, track representative for Mathematics, 2006–11.

Organizer and principal lecturer, University of Utah summer REU program, “Mathematics of Games of Chance,” 2005.

Department of Mathematics Executive Committee, 1989–90, 2003–04.