

**CURRICULUM VITAE:  
WILLIAM BARNES ARVESON**

16 December, 2010

BASICS

1934 Born November 22 at Oakland, CA  
1960 B.S. Caltech, Mathematics  
1963 M.A. UCLA, Mathematics  
1964 Ph.D. UCLA, Mathematics

EMPLOYMENT HISTORY

1952–56: US Navy  
1960–61: Mathematician GS–7, Naval Undersea Research and Development Center, Pasadena, CA (Full year)  
1964–65: Mathematician GS–12, Naval Undersea Research and Development Center, Pasadena, CA (Fall)  
1965: Acting Assistant Professor, UCLA (spring)  
1965–68: Benjamin Peirce Instructor, Harvard University  
1968–69: Lecturer in Mathematics, UC Berkeley  
1969–74: Associate Professor of Mathematics, UC Berkeley  
1974–2003: Professor of Mathematics, UC Berkeley  
2003–: Professor of Mathematics Emeritus, UC Berkeley

FELLOWSHIPS, VISITS, ETC.

1971: National Research Council Fellow, University of Newcastle (June–July)  
1973–74: Guest Professor, Aarhus University  
1975–76 Visiting Professor, UCSD  
1976–77: John Simon Guggenheim Fellow  
1977: Visiting Professor, IMPA, Rio de Janeiro (Sept.–Oct.)  
1980: Visiting Professor, Mittag-Leffler Institute (March–May)  
1981: Senior Fellow, University of Newcastle (June–July)  
1985: Visiting Professor, Nankai and Peking Universities (Sept.–Oct.)  
1985–86: Miller Research Professor, Berkeley  
1987: Toeplitz Lecturer, Tel Aviv University (May)  
1989: Visiting Professor, Mittag-Leffler Institute (March–May)  
1999–00: Miller Research Professor, Berkeley  
2001: Visiting Professor, Center for Advanced Studies, Oslo (October)  
2004: Visiting Professor, Kyoto University (March)

## PH.D. STUDENTS

1. Richard I. LoebI (1973) *Topics in operator algebras*
2. Donal P. O'Donovan (1973) *Weighted shifts and covariance algebras*
3. Kenneth Davidson (1976) *Compact perturbations of operator algebras*
4. Cecelia Laurie Bleecker (1976) *Structural questions concerning commutative subspaces and their associated operator algebras*
5. David Larson (1976) *On certain reflexive operator algebras*
6. Jon Kraus (1977) *Compact abelian groups of automorphisms of von Neumann Algebras*
7. Thomas Fall (1977) *Compact Perturbations of Nest Algebras*
8. Niels Toft Andersen (1977) *Compact Perturbations of Reflexive operator algebras*
9. Earl Eugene Kymala (1980) (student at UC Davis) *Circular operators*
10. Bruce Wagner (1980) *Automorphisms of nest algebras*
11. Belisario Ventura (1984) *On spectral subspaces of covariant Representations of  $C^*$ -algebras*
12. John Spielberg (1985) *Extensions of subalgebras of AF algebras*
13. Jack ShaiO (1985) *Approximate equivalence for representations of certain  $C^*$ -algebras and  $C^*$ -dynamical systems*
14. David Pitts (1986) *Factorization problems and the  $K$ -groups of nest algebras*
15. Richard Baker (1987) *Triangular UHF algebras*
16. Michael Lamoureux (1988) *Analytic isomorphisms of transformation group  $C^*$ -algebras*
17. Chikaung Pai (1988) *Quasitriangular operators in II factors*
18. Hung Dinh (1989) *Discrete product systems and their  $C^*$ -algebras*
19. Marcelo Laca (1989) *Representations of Cuntz algebras and endomorphisms of type I factors*
20. Keith Manson (1989–'informal' advisor) *Generalized Weyl representations and the quantization of nonlinear Hamiltonian systems*
21. Neal Fowler (1993) *Free  $E_0$ -semigroups*
22. Frederick Semwogerere (1994) *Discrete representations of the Bratteli non-commutative spheres*
23. Alexander AlevrAs (1995) *Semigroups of endomorphisms of  $\mathcal{B}(H)$  and type  $II_1$  factors*
24. Masayasu Aotani (1996) *On certain algebras associated with continuous tensor product systems*
25. Dylan SeLegue (1997) *Semigroups of completely positive maps and a theorem of Szegö*
26. Devin Greene (2001) *On certain invariants in multivariable operator theory*
27. Daniel Markiewicz (2002) *Completely positive semigroups and their product systems*
28. Ilan Hirshberg (2003)  *$C^*$ -Algebras and Endomorphisms Associated to Systems of Hilbert Modules*
29. Dennis Courtney (2008) *Asymptotic lifts of CP semigroups*

M.A. STUDENTS (PARTIAL LIST)

1. Rita Barba (1983), *Studies in Fourier series*
2. Nora Scopetta (1983), *Measure theory and probability*
3. Catherine Barnaby (1987), *Topics in operator theory*

## POSTDOCTORAL &amp; RESEARCH SCHOLARS SUPERVISED (PARTIAL LIST)

1. Rajendra Bhatia (1979–80), Operator theory.
2. Wolfgang Arendt (1982–83), Operator algebras.
3. Niels Toft Andersen (1983), Operator algebras.
4. Donal P. O'Donovan (1983), Operator algebras.
5. R. L. Moore (1984–85), Operator theory.
6. Scott Brown (1984–85), Operator theory.
7. John Froelich (1984–85), Operator algebras.
8. Yiu Tung Poon (1988–89), Operator algebras.
9. Efton Park (1988–90), Operator algebras/index theory.
10. Ronghui Ji (1989–91), Operator algebras.
11. Donal P. O'Donovan (1990), Operator algebras.
12. Stephen Parrott (1990–91), Operator theory, physics.
13. Gregory White (1990–91), Self-adjoint Hamiltonian systems.
14. Keith Manson (1990–91), Quantization of classical systems.
15. Shijie Lu (1991–92), Functional analysis.
16. David Blecher (1991–93), Operator algebras.
17. Piotr Podles (1994–96), C\*-algebras, quantum groups.
18. Wolfgang Arendt (1998), Semigroups, Operator theory.
19. Nazar Abdelaziz (1998–99), Functional analysis.
20. Remus Floricel (2004–06), Noncommutative dynamics.

## EDITORIAL SERVICE

*Duke Mathematical Journal*, associate editor (1976–87)  
*Journal of Operator Theory*, associate editor (1979–87)  
*Journal of Operator Theory*, editor (1987–)  
*Bulletin AMS*, associate editor, research announcements (1987–91)  
*Journal of the Edinburgh Mathematical Society*, consulting editor (1989–94)

## PAPERS

1. *A theorem on the action of abelian unitary groups*, Pac. J. Math. **16** (1966), 205–212.
2. *An algebraic conjugacy invariant for measure preserving transformations*, Bull. AMS **73** (1967).
3. *Analyticity in operator algebras*, Amer. J. Math. **89** (1967), 578–642.
4. *Operator algebras and measure preserving automorphisms*, Acta Math. **118** (1967), 95–109.
5. *A density theorem for operator algebras*, Duke Math. J. **34** (1967), 635–648.
6. (with J. Feldman), *A note on invariant subspaces*, Mich. Math. J. **15** (1968), 61–64.
7. *On subalgebras of C\*-algebras*, Bull. AMS **75** (1969), 790–794.
8. (with K. B. Josephson), *Operator algebras and measure preserving automorphisms II*, J. Funct. Anal. **4** (1969), 100–134.
9. *Subalgebras of C\*-algebras*, Acta Math. **123** (1969), 141–224.
10. *Unitary invariants for compact operators*, Bull. AMS **76** (1970), 88–91.
11. *Operators with compact imaginary part*, Ind. Univ. Math. J. **20** (1971), 877–878.

12. *Subalgebras of  $C^*$ -algebras II*, Acta Math. **128** (1972), 271–308.
13. *On groups of automorphisms of operator algebras*, J. Funct. Anal. **15** (1974), 217–243.
14. *Operator algebras and invariant subspaces*, Ann. Math. **100** (1974), 433–532.
15. *A note on essentially normal operators*, Proc. Royal Irish Acad. Section A **74** (1975), 208–233.
16. *Interpolation problems in nest algebras*, J. Funct. Anal. **20** (1975), 208–233.
17. *A spectral theorem for nonlinear operators*, Bull. AMS **82** (1976), 511–513.
18. *Spectral theory for nonlinear random processes*, in Symposia Mathematica, Istituto Nazionale di Alta Matematica, vol. 20, 1976, pp. 531–537.
19. *Notes on extensions of  $C^*$ -algebras*, Duke Math. J. **44** (1977), 329–355.
20. (with T. Fall and P. Muhly), *Perturbations of nest algebras*, J. Oper. Th. **1** (1979), 137–150.
21. *The harmonic analysis of automorphism groups*, in Proceedings of Symposia in Pure Mathematics part I, Operator Algebras and Applications, vol. 38, AMS, 1982, pp. 199–269.
22. *Quantization and the uniqueness of invariant structures*, Comm. Math. Phys. **89** (1983), 77–102.
23. *Perturbation theory for groups and lattices*, J. Funct. Anal. **53** (1983), 22–73.
24. (with D. Hadwin, T. Hoover, and E. Kymala), *Circular operators*, Ind. Univ. Math. J. **33** (1984), 583–595.
25. *Ten Lectures on Operator Algebras*, CBMS Regional Conferences in Mathematics, vol. 55, AMS, Providence, 1984, pp. viii + 93.
26. *Continuous nests and the absorption principle*, in Operator Algebras and their Connections with Topology and Ergodic Theory, Lecture Notes in Mathematics, vol. 1132, Springer-Verlag, Berlin, 1985, pp. 17–29.
27. *Markov operators and  $OS$ -positive processes*, J. Funct. Anal. **66** (1986), 173–234.
28. *Nonlinear states on  $C^*$ -algebras*, in Contemporary Mathematics, vol. 62, AMS, 1987, pp. 283–343.
29. *Continuous Analogues of Fock Space*, American Mathematical Society Memoirs, vol. 80 no 409, AMS, Providence, 1989, pp. iv + 66.
30. *An addition formula for the index of semigroups of endomorphisms of  $\mathcal{B}(H)$* , Pac. J. Math. **137 no. 1** (1989), 19–36.
31. *Continuous analogues of Fock space III: Singular states*, J. Oper. Th. **22** (1989), 165–205.
32. *Continuous analogues of Fock space II: the spectral  $C^*$ -algebra*, J. Funct. Anal. **90 no. 1** (1990), 138–205.
33. *The spectral  $C^*$ -algebra of an  $E_0$ -semigroup*, in Proceedings of Symposia in Pure Mathematics, part I, Operator Theory/Operator Algebras and Applications, vol. 51, AMS, 1990, pp. 1–15.
34. *Continuous analogues of Fock space IV: essential states*, Acta Math. **164** (1990), 265–300.
35. *Quantizing the Fredholm index*, in Pitman Research Notes in Mathematics, Operator Theory: Proceedings of the 1988 GPOTS–Wabash conference, vol. 225, Longman, 1990, pp. 1–32.
36.  *$C^*$ -algebras associated with sets of semigroups of isometries*, Int. J. Math. **2 no 3** (1991), 235–255.
37. *A note on extensions of  $E_0$ -semigroups (with Akitaka Kishimoto)*, Proc. AMS **116 no 3** (1992), 769–774.
38. R. Herman and B. Tanbay (ed.), *Non-commutative spheres and numerical quantum mechanics*, Operator algebras, Mathematical Physics, and Low-Dimensional Topology, Research Notes in Math. vol. 5 ISBN 1-56881-027-X, A. K. Peters, 1993, pp. 1–10.
39. *Discretized  $CCR$  algebras*, Journal of Operator Theory **26** (1991), 225–239.
40. *Improper filtrations for  $C^*$ -algebras: spectra of unilateral tridiagonal operators*, Acta Sci. Math (Szeged) **57** (1993), 11–24.
41.  *$C^*$ -algebras and numerical linear algebra*, Jour. Funct. Anal. **122 no. 2** (1994), 333–360.
42. *The role of  $C^*$ -algebras in infinite dimensional numerical linear algebra*, Contemporary Mathematics, A.M.S. 0271-4132/94, vol. 167, 1994, pp. 115–129.
43. W. Arveson, T. Branson, and I. E. Segal (ed.),  *$E_0$ -semigroups in quantum field theory*, Quantization, Nonlinear Partial Differential Equations, and operator Algebra, Proc. Symp. Pure Math., vol. 59 (1996), Amer. Math. Soc., pp. 1–26.
44. S. Doplicher, R. Longo, J. E. Roberts, L. Zsido (ed.), *Dynamical Invariants for noncommutative flows*, Operator Algebras and Quantum Field Theory, Accademia Nazionale dei Lincei, Roma, International Press, 1997, pp. 476–514.

45. P. A. Fillmore and J. Mingo (ed.), *Minimal  $E_0$ -semigroups*, Operator algebras and their applications, Fields Institute Communications, vol. 13, AMS, 1997, pp. 1–12.
46. A. Katavolos (ed.), *Path spaces, continuous tensor products, and  $E_0$ -semigroups*, Operator Algebras and Applicati, Series C: Math. and Phys. Sci., vol. 495 (1997), Kluwer Academic Publishers, pp. 1–112.
47. *The index of a quantum dynamical semigroup*, J. Funct. Anal. **146**, no. **2** (1997), 557–588.
48. *Pure  $E_0$ -semigroups and absorbing states*, Comm. Math. Phys. **187** (1997), 19–43.
49. *Subalgebras of  $C^*$ -algebras III: multivariable operator theory*, Acta Math **181** (1998), 159–228.
50. *The curvature of a Hilbert module over  $\mathbb{C}[z_1, \dots, z_d]$* , Proc. Nat. Acad. Sci. USA **96** (1999), 11096–11099.
51. *On the index and dilations of completely positive semigroups*, Int. J. Math. **10** (1999), 791–823.
52. *The curvature invariant of a Hilbert module over  $\mathbb{C}[z_1, \dots, z_d]$* , J. reine angew. Mat. **522** (2000), 173–236.
53. *Interactions in noncommutative dynamics*, Comm. Math. Phys. **211** (2000), 63–83.
54. *Infinite tensor products of completely positive semigroups*, with Geoffrey Price, J. Evol. Eq. **1** (2001), 221–242.
55. *The Dirac operator of a commuting  $d$ -tuple*, J. Funct. Anal. **189**(1) (2002), 53–79.
56. *The domain algebra of a  $CP$ -semigroup*, Pac. J. Math. **203** (2002), 66–77.
57. *The heat flow of the  $CCR$ -algebra*, Bull. L.M.S. **34**(1) (2002), 73–83.
58. *The structure of spin systems*, with Geoffrey Price, Int. J. Math. **14**, no. **2** (2003), 119–137.
59. *Generators of noncommutative dynamics*, Erg. Th. Dyn. Syst. **22**, no. **4** (2003), 1017–1030.
60. *Four lectures on noncommutative dynamics*, Advances in quantum dynamics, Contemp. Math. vol 335, AMS, Providence, R. I., 2002, pp. 1–55.
61. *Asymptotic stability I: Completely positive maps*, Int. J. Math. **15**, no. **3** (2004), 289–312.
62. *The universal  $A$ -dynamical system*, Operator algebras, quantization, and noncommutative geometry, Contemp. Math. 365, AMS, Providence, R.I., 2004, pp. 27–39.
63. *The free cover of a row contraction*, Documenta Math. **9** (2004), 137–161.
64.  *$p$ -summable commutators in dimension  $d$* , J. Oper. Th. **54**, no. **1** (2005), 101–117.
65. *Diagonals of self-adjoint operators*, Joint with Richard Kadison, proceedings of GPOTS 20, Contemp. Math. 414, AMS, 2006, pp. 247–263.
66. *On the existence of  $E_0$ -semigroups*, Inf. Dimens. Anal. Quantum Prob. **6** (2006), 315–320.
67. *Diagonals of normal operators with finite spectra*, Proceedings of the National Academy of Sciences USA **104** (2007), 1152–1158.
68. *The asymptotic lift of a completely positive map*, J. Funct. Anal., **248** (2007), 202–224.
69. *Quotients of standard Hilbert modules*, Trans. AMS, **359**, no. **12** (2007), 6027–6055.
70. *Asymptotic lifts of positive linear maps (with Erling Stormer)*, Pacific J. Math., **233**, (2007), 1–14.
71. *Lifting endomorphisms to automorphisms (with Dennis Courtney)*, Proc. Amer. Math. Soc., **136** (2008), 2073–2079.
72. *The noncommutative Choquet boundary*, Journal AMS, **21** (2008), 1065–1084.
73. *The probability of entanglement*, Comm. Math. Phys., **286** (2009), 283–312.
74. *Quantum channels that preserve entanglement*, Math. Ann., **343**, (2009), 757–771.
75. *Maximal vectors in Hilbert space and quantum entanglement*, J. Funct. Anal., **256**, (2009), 1476–1510.
76. *Dilation Theory Yesterday and Today*, A Glimpse at Hilbert Space Operators, Paul Halmos in Memoriam, editors Axler, S. Rosenthal, P. and Sarason, D., in series Operator Theory: Advances and Applications, Birkhäuser Verlag, Basel, 2010, pp. 99–123.

## PAPERS IN PRESS

- [1] *The noncommutative Choquet boundary II: Hyperrigidity*, Israel J. Math, 30pp..
- [2] *The noncommutative Choquet boundary III: Operator systems in matrix algebras*, Math. Scand., 13pp..

## BOOKS

- [1] *An invitation to  $C^*$ -algebras*, Graduate texts in Mathematics (reprinted: 1998), vol. 39, Springer-Verlag, New York, 1976, pp. x + 106.
- [2] (co-edited with R. G. Douglas) *Operator Theory, Operator algebras and Applications*, Proceedings of Symposia in Pure Mathematics, vol. 51 (in two parts), AMS, Providence, 1990, pp. xii + 640 + 385.
- [3] (co-edited with A. S. Mischenko, M. Putinar and M. A. Rieffel) *Operator algebras and topology*, Pitman Research Notes in Mathematics, vol. 270, 271 (in two parts), 1992, pp. 196+216.
- [4] (co-edited with T. Branson and I. E. Segal) *Quantization, Nonlinear Partial Differential Equations, and Operator Algebra*, Proceedings of Symposia in Pure Math , vol 59, Amer. Math. Soc., 1996.
- [5] *A Short Course on Spectral Theory*, Graduate texts in Mathematics, vol. 209, Springer-Verlag, New York, 2001, pp. x + 135.
- [6] *Noncommutative Dynamics and E-semigroups*, Monographs in Mathematics, Springer-Verlag, New York, 2003, pp. x + 434.

## RECENT INVITED LECTURES

March 2006: Erdős Colloquium, University of Florida

March 2006: Plenary lecture, Southeastern Analysis Meeting, Gainesville

April 2006: Mallat Family Lecture Series, the Technion, Haifa, Israel

April 2006: Myhill Lectures, State University of New York, Buffalo

May 2006: Principal lecturer (3 talks), Canadian operator algebras symposium, Calgary, Canada

October 2006: Plenary lecture, Western meeting of the AMS, Salt Lake City

July 2007: Plenary lecture, Fields institute workshop, Toronto, Canada

July 2007: Plenary lecture, International conference on operator spaces, Luminy, France

December 2007: Plenary lecture, International conference on operator algebras, Oslo, Norway

August 2008: Plenary lecture, SUMIFAS, College Station, Texas

October 2009: Plenary lecture, North British Functional Analysis Seminar, Newcastle, UK

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