

## WILLIAM BRENT LINDQUIST

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### Education

Cornell University	PhD - Physics	1981
University of Manitoba	BSc (Honours) - Physics	1975

### Positions

Jan. 1989-present	Department of Applied Mathematics and Statistics State University of New York at Stony Brook Sept. 1999 - Associate Chair Sept. 1994 - Full Professor Jan. 1989 - Associate Professor
Sept. 1981 - Dec. 1988	Courant Institute of Mathematical Sciences New York University Sept. 1988 - Research Associate Professor Jan. 1985 - Research Assistant Professor Sept. 1981 - Associate Research Scientist

### Visiting Positions

Aug. 1996 – July. 1997	TICAM Fellow, The University of Texas at Austin
Sept. 1996 – Dec. 1996	Visiting Professor, Dept. of Mathematics, UT-Austin

### Honours

Chancellor's Award for Excellence in Teaching, State University of New York at Stony Brook, 2002  
President's Award for Excellence in Teaching, State University of New York at Stony Brook, 2002  
Outstanding Teacher awards, F'02, F'01, F'00, F'97, S'96, S'95, S'94  
University of Manitoba Gold Medalist: Science, 1975; Physics, 1975

### Patents

System and Method for Determining Neuronal Morphology and Effect of Substances Thereon. I. Koh, W. B. Lindquist and K. Svoboda. Pending. Publication number US-20020004632

## Research Support

### Current

Title: Medial Axis Analysis Applied to Tomographic Images of Fibrous Material  
Agency: Kimberly-Clark Corporation  
Amount: \$35,458  
Period: 4/15/03–4/14/04

Title: Pore Scale Geometric and Fluid Distribution Analysis  
Agency: DOE  
Amount: \$196,237  
Period: 9/1/01–8/31/04

Title: Automated Morphometry of Dendritic Spines  
Agency: NSF  
Amount: \$180,000  
Period: 9/30/01–8/31/03

### Pending

Title: Stony Brook Applied Math MCTP Project  
Agency: NSF  
Amount: \$1,907,780  
co-PI(s): A. Tucker, et al.  
Period: 07/01/04–06/30/09

### Past

Title: Automated Analysis of Neurite Outgrowth of Explants  
Agency: Brookhaven National Lab.  
Amount: \$21,470  
Period: 09/01/01–05/30/02

Title: VIGRE: Interconnecting Research and Education in the Mathematical Sciences at Stony Brook  
Agency: NSF  
Amount: \$2,606,355  
co-PI(s): A. Tucker, D. McDuff, et al.  
Period: 1/1/00–12/31/04

Title: Medial Axis Analysis Applied to Tomographic Images of Fibrous Material  
Agency: Kimberly Clark Corp.  
Amount: \$216,589  
Period: 3/1/96–4/14/03

Title: Theory and Stochastic Simulation Methods for Multi Scale Problems with Energy-Related Applications  
Agency: DOE  
Amount: \$1,822,414  
co-PI: J. Glimm  
Period: 2/1/99–1/31/02

Title: Microscale Geometric Analysis of Geologic Porous Media  
Agency: DOE  
Amount: \$165,000  
Period: 9/1/98–8/31/01

Title: Automated Analysis of Neurite Outgrowth of Explants  
Agency: Swartz Initiative for Computational Neuroscience  
Amount: \$30,468  
Period: 09/01/00–08/31/01

Title: Stochastic Partial Differential Equations Applied to the Predictability of Complex Multiscale Phenomena  
Agency: DOE co-PIs: Y. Deng, J. Glimm, F. Tangerman  
Amount: \$300,000 Period: 8/1/98–7/31/01

Title: Enhanced Resolution Simulation Methods, Mathematical Theory, and Energy Related Applications  
Agency: DOE co-PI: J. Glimm  
Amount: \$1,188,696 Period: 2/1/96–1/31/99

Title: Los Alamos - Stony Brook Collaboration  
Agency: Los Alamos National Laboratory co-PIs: J. Glimm, B. Plohr  
Amount: \$78,750 Period: 3/18/98–5/31/98

Title: Statistical Characterization of the Three-Dimensional Microgeometry of Porous Media  
Agency: Sandia National Laboratory  
Amount: \$100,000 Period: 11/15/96–9/30/98

Title: Medial Axis Analysis of Porous Media  
Agency: DOE  
Amount: \$100,968 Period: 9/1/95–8/31/98

Title: Partnership in Computational Science  
Agency: DOE co-PI: J. Glimm  
Amount: \$469,200 Period: 7/15/95–7/14/97

Title: Traineeship for Pawel Dzedzic  
Agency: Brookhaven National Laboratory  
Amount: \$14,030 Period: 10/1/95–8/31/96

Title: Computations and Theory for Discontinuous and Stochastic Solutions of Partial Differential Equations  
Agency: DOE co-PI: J. Glimm  
Amount: \$1,176,363 Period: 1/1/93–1/31/96

Title: 3-Dimensional Imaging of Drill Core Samples Using Synchrotron Computed Microtomography  
Agency: DOE  
Amount: \$64,430 Period: 5/1/92–4/30/95

Title: Long Island's Groundwater Hydrology  
Agency: Suffolk County Water Authority co-PI: H. Bokuniewicz  
Amount: \$100,000 Period: 3/1/94–2/27/95

Title: Evaluation of PICS Groundwater Code GCT 1.0  
Agency: Brookhaven National Laboratory  
Amount: \$20,000 Period: 4/22/94–9/30/94

Title: High Performance Computing Equipment for Environmental Remediation Modeling and First Principles Simulation of Material Properties

Agency: DOE	co-PI: J. Glimm
Amount: \$700,000	Period: 4/15/93–4/14/94
Title: High Performance Computing of Ground-water Transport	
Agency: Oak Ridge National Laboratory	co-PIs: J. Glimm, A. Kaufman
Amount: \$838,600	Period: 6/01/92–4/31/95
Title: Modeling of Complex Continua	
Agency: DOE	co-PIs: J. Glimm, Y. Deng
Amount: \$1,176,391	Period: 1/1/90–12/31/92
Title: Fundamental Solutions of Multiphase Flow	
Agency: NATO	co-PIs: B. Plohr, D. Marchesin
Amount: \$40,000	Period: 1/10/89–9/31/91
Title: Heterogeneities in Reservoirs	
Agency: Petrocomp Software	
Amount: \$5,000	Period: 2/1/89–7/30/89

### Current Collaborators

J. Dunsmuir (Exxon Research & Engineering), J. Fredrich (Sandia National Lab), P. Hopf (Mt. Sinal School of Medicine), M. Knackstedt (Australian National Univ. - Canberra), Y.-X. Qin (SUNY - Stony Brook), R. Seright (Petroleum Res. Recovery Cntr, New Mexico Tech), A. Singh (Kimberly-Clark), K. Svoboda (Cold Spring Harbor Lab), A. Tucker (SUNY - Stony Brook), S. Wearne (Mt. Sinai School of Medicine), T.-f. Wong (SUNY - Stony Brook)

### Publications

- M. Prodanovic, W.B. Lindquist, and R.S. Seright. 3D microtomographic study of fluid displacement in rock cores. To be presented at the Computational Methods in Water Resources XV Conference, Chapel Hill, NC, June 13–17. [ftp://ams.sunysb.edu/pub/papers/2004/susb04\\_01.ftp](ftp://ams.sunysb.edu/pub/papers/2004/susb04_01.ftp) - A. Kulkarni, W.B. Lindquist, A. Goland, H. Herman, J. Ilavsky, G. Long and F. DeCarlo. Quantitative microstructural analysis of EB-PVD thermal barrier coatings using high-resolution computed microtomography. To be submitted to J. Microscopy.
- R.S. Seright, M. Prodanovic, and W.B. Lindquist. X-ray computed microtomography studies of disproportionate permeability reduction. SPE paper #89393, to be presented at the 14th SPE/DOE Symposium on Improved Oil Recovery, Tulsa, OK, Apr. 17–21, 2004. [ftp://ams.sunysb.edu/pub/papers/2003/susb03\\_19.doc](ftp://ams.sunysb.edu/pub/papers/2003/susb03_19.doc)
- C.M. Weaver, P.R. Hof, S.L. Wearne and W.B. Lindquist. Automated algorithms for multiscale morphometry of neuronal dendrites. *Neural Computation*, accepted. [ftp://ams.sunysb.edu/pub/papers/2003/susb03\\_17.pdf](ftp://ams.sunysb.edu/pub/papers/2003/susb03_17.pdf)
- M. Maravall, Y.Y. Koh, W.B. Lindquist, and K. Svoboda. Experience-dependent changes in basal dendritic branching of layer 2/3 pyramidal neurons during a critical period for developmental plasticity in rat barrel cortex. *Cerebral Cortex*, in press.

- A. Kulkarni, J. Gutleber, S. Sampath, A. Goland, W.B. Lindquist, H. Herman, A.J. Allen and B. Dowd. Studies of the microstructure and properties of dense ceramic coatings produced by high-velocity oxygen-fuel combustion spraying. *J. Mater. Sci. Engin. A* **369** (2004) 124–137. [ftp://ams.sunysb.edu/pub/papers/2004/susb04\\_04.pdf](ftp://ams.sunysb.edu/pub/papers/2004/susb04_04.pdf)
- I. Kim, W.B. Lindquist and W.B. Durham. Fracture flow simulation using a finite difference lattice Boltzmann method. *Phys. Rev. E.* **67** (2003) 046708. [ftp://ams.sunysb.edu/pub/papers/2002/susb02\\_21.pdf](ftp://ams.sunysb.edu/pub/papers/2002/susb02_21.pdf)
- C. M. Weaver, J.D. Pinezich, W.B. Lindquist and M. Vazquez. An algorithm for reconstruction of neurite outgrowth images. *J. Neurosci. Meth.* **124** (2003) 197–205. [ftp://ams.sunysb.edu/pub/papers/2001/susb01\\_10.pdf](ftp://ams.sunysb.edu/pub/papers/2001/susb01_10.pdf)
- K.W. Jones, H. Feng, W.B. Lindquist, P.M. Adler, J.-F. Thovert, B. Vekemans, L. Vincze, I. Szaloki, R. Van Grieken, F. Adams, C. Riekkel. Study of the microgeometry of porous materials using synchrotron computed microtomography. In *Applications of X-ray Computed Tomography in the Geosciences*, F. Mees, R. Swennen, M. Ven Geet, P. Jacobs, eds. Geological Society, London, Special Publications, **215** (2003) 39–49.
- W. Guo, W.B. Lindquist and W. Oh. A parallelized, structured-unstructured hybrid, tetrahedral grid construction. Preprint SUNYSB-AMS-02-10.
- R.S. Seright, J. Liang, W.B. Lindquist and J.H. Dunsmuir. Use of X-ray computed microtomography to understand why gels reduce permeability to water more than to oil. *J. Petroleum Sci. Eng.*, **39** (2003) 217–230. [ftp://ams.sunysb.edu/pub/papers/2002/susb02\\_03.pdf](ftp://ams.sunysb.edu/pub/papers/2002/susb02_03.pdf)
- S.Y. Cho and W.B. Lindquist. Predictability in Stochastic Reservoirs. Preprint SUNY-SB-AMS-01-21.
- W.B. Lindquist. Network flow model studies and 3D pore structure. *Contemporary Mathematics*, **295** (2002) 355–366. [ftp://ams.sunysb.edu/pub/papers/2001/susb01\\_14.pdf](ftp://ams.sunysb.edu/pub/papers/2001/susb01_14.pdf)
- W. Hwang and W.B. Lindquist. The 2-dimensional Riemann problem for a 2x2 hyperbolic conservation law I. isotropic media. *SIAM J. Math. Anal.* **34** (2002) 341–358. [ftp://ams.sunysb.edu/pub/papers/2001/susb01\\_11.pdf](ftp://ams.sunysb.edu/pub/papers/2001/susb01_11.pdf)
- W. Hwang and W.B. Lindquist. The 2-dimensional Riemann problem for a 2x2 hyperbolic conservation law II. anisotropic media. *SIAM J. Math. Anal.* **34** (2002) 359–384. [ftp://ams.sunysb.edu/pub/papers/2001/susb01\\_12.pdf](ftp://ams.sunysb.edu/pub/papers/2001/susb01_12.pdf)
- W.B. Lindquist. Quantitative analysis of three dimensional X-ray tomographic images, in *Developments in X-ray Tomography III*, U. Bonse (ed.), Proceedings of SPIE **4503**, 103–115. SPIE, Bellingham, WA, 2002. [ftp://ams.sunysb.edu/pub/papers/2001/susb01\\_06.pdf](ftp://ams.sunysb.edu/pub/papers/2001/susb01_06.pdf)
- I.Y.Y. Koh, W.B. Lindquist, K. Zito, E.A. Nimchinsky and K. Svoboda. An Image Analysis Algorithm for the Fine Structure of Neuronal Dendrites. *Neural Comput.* **14** (2002) 1283–1310. [ftp://ams.sunysb.edu/pub/papers/2001/susb01\\_01.pdf](ftp://ams.sunysb.edu/pub/papers/2001/susb01_01.pdf)
- R.S. Seright, J.-T. Liang, W.B. Lindquist, and J.H. Dunsmuir. Characterizing disproportionate permeability reduction using synchrotron X-ray computed microtomography. *SPE Reserv. Eval. Eng.*, **5** (2002) 355–364. [ftp://ams.sunysb.edu/pub/papers/2002/susb02\\_02.pdf](ftp://ams.sunysb.edu/pub/papers/2002/susb02_02.pdf)

- C.H. Arns, M.A. Knackstedt, W.V. Pinczewski and W.B. Lindquist. Accurate estimation of transport properties from microtomographic images. *Geophys. Res. Lett.*, **28** (2001) 3361–3364.
- I.Y.Y. Koh and W.B. Lindquist. Automated 3D dendritic spine detection and analysis from two-photon microscopy, in Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing VIII, J.-A. Conchello, C.J. Cogswell and T. Wilson (eds.), Proceedings of SPIE, **4261**. SPIE, Bellingham, WA, 2001.
- S.-R. Song, K.W. Jones, W.B. Lindquist, B.A. Dowd, and D.L. Sahagian. Synchrotron X-ray computed microtomography (CMT) studies on vesiculated basaltic rocks. *Bulletin of Volcanology* **63** (2001) 252–263. [ftp://ams.sunysb.edu/pub/papers/2003/susb03\\_01.doc](ftp://ams.sunysb.edu/pub/papers/2003/susb03_01.doc)
- H. Yang and W.B. Lindquist. Three-dimensional image analysis of fibrous materials. Applications of Digital Image Processing XXIII, A.G. Tescher (ed.), Proceedings of SPIE **4115**, 275–282. SPIE, Bellingham, WA, 2000.
- I.Y.Y. Koh and W.B. Lindquist. 3DMA Dendrite/Spine Detection Users Manual. SUNY-Stony Brook report, SUNYSB-AMS-00-03, 2000.
- R.M. Sok, M.A. Knackstedt, A.P. Sheppard, W.V. Pinczewski, W.B. Lindquist, A. Venkatarangan, L. Paterson. Direct and stochastic generation of network models from tomographic images: Effect of topology on residual saturations. *Transport in Porous Media* **46** (2002) 345–371.
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- W.B. Lindquist. 3DMA General Users Manual, SUNY-Stony Brook report SUNYSB-AMS-99-20, 1999.
- J.T. Fredrich, D.R. Noble, R.M. O’Connor, and W.B. Lindquist. Development, implementation, and experimental validation of the lattice Boltzmann method for modeling three-dimensional complex flows. Sandia National Laboratory report SAND99-0369. February, 1999.
- W. Oh and W.B. Lindquist. Image thresholding by indicator kriging, *IEEE Trans. Pattern Anal. Mach. Intell.*, **21**, (1999) 590–602. [ftp://ams.sunysb.edu/pub/papers/1998/susb98\\_02.ps.gz](ftp://ams.sunysb.edu/pub/papers/1998/susb98_02.ps.gz)
- W.B. Lindquist and A. Venkatarangan. Investigating 3D geometry of porous media from high resolution images, *Phys. Chem. Earth (A)*, **25**, (1999) 593–599. [ftp://ams.sunysb.edu/pub/papers/1998/susb98\\_01.ps.gz](ftp://ams.sunysb.edu/pub/papers/1998/susb98_01.ps.gz)
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- B. Bielefeld, J. Glimm, W.B. Lindquist, and F. Tangerman. Incorporation of two dimensional front-tracking into PICS GCT 1.0. SUNY-Stony Brook report SUNYSB-AMS-93-07, 1993.
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- J. Glimm, W.B. Lindquist, F. Pereira and Q. Zhang. A theory of macrodispersion for the scale up problem. *Transport in Porous Media*, **13**, (1993) 97–122.
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- J. Glimm and W.B. Lindquist. Scaling laws for macrodispersion. proceedings of the Ninth International Conference on Computational Methods in Water Resources, Vol. 2: Mathematical Modeling in Water Resources, pp. 35-49. Computational Mechanics Publications, Southampton, UK, 1992.
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- F. Furtado, J. Glimm, W.B. Lindquist, F. Pereira and Q. Zhang. Time dependent anomalous diffusion for flow in multi-fractal porous media. Proceedings of the Workshop on Numerical Methods for the Simulation of Multi-phase and Complex Flow, Amsterdam. May, 1990. Lecture Notes in Physics, **398** (1991) pp. 79-89, T. M. M. Verheggen, ed., Springer Verlag, New York.
- F. Furtado, J. Glimm, W.B. Lindquist, and F. Pereira. Characterization of mixing length growth for flow in heterogeneous porous media. SPE paper # 21233, presented at the 11th SPE Symposium on Reservoir Simulation, Anaheim, CA, Feb. 17-21, 1991.
- F. Furtado, J. Glimm, W.B. Lindquist, and F. Pereira. Multi-length scale computations of the mixing length growth in tracer flow. Proceedings of the Emerging Technologies Conference, F. Kovarik, ed., Houston, TX, July 1990.
- T. Kinoshita and W.B. Lindquist. Eighth-order anomalous magnetic moment of the electron. V. Diagrams containing no vacuum polarization loop. *Phys. Rev. D*, **42**, (1990).
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- J. Glimm, W.B. Lindquist, and Q. Zhang. Front tracking, oil reservoirs, engineering scale problems and mass conservation. *IMA Vol. Math. Appl.* **29**, (1991) pp. 123-139.
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- F. Furtado, J. Glimm, J. Grove, X. L. Li, W.B. Lindquist, R. Menikoff, D. H. Sharp, and Q. Zhang. Front tracking and the interaction of nonlinear hyperbolic waves. Lecture Notes in Engineering, **43**, (1989) pp. 99-111.
- W.B. Lindquist. The two dimensional interaction of nonlinear hyperbolic waves: examples from two phase flow in porous media. Proceedings of the 1988 International Conference on Theory and Applications of Differential Equations, R. Aftabizadeh, ed., Ohio University Press, Athens, 1989.
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- T. Kinoshita and W.B. Lindquist. Eighth-order anomalous magnetic moment of the electron. II. Fourth-order vertex containing second- and fourth-order vacuum polarization subdiagrams. *Phys. Rev. D* **27**, (1983) pp. 877-885.
- T. Kinoshita and W.B. Lindquist. Eighth-order anomalous magnetic moment of the electron. I. Second-order vertex containing second- fourth-, and sixth-order vacuum polarization subdiagrams. *Phys. Rev. D* **27**, (1983) pp. 867-876.

- T. Kinoshita and W.B. Lindquist. Parametric formula for the sixth-order vacuum polarization contribution in quantum electrodynamics. *Phys. Rev. D* **27**, (1983) pp. 853-866.
- T. Kinoshita and W.B. Lindquist. Eighth-order anomalous magnetic moment of the electron. *Phys. Rev. Lett.* **47**, (1981) pp. 1573-1576.

## **Professional Service**

AMS-IMS-SIAM Committee on Joint Summer Research Conferences in the  
Mathematical Sciences, 7/1/97 – 6/30/01

Grant Selection Committee for Pure and Applied Mathematics, NSERC (Canada),  
7/1/98 – 6/30/01

Vice Chair, SIAM Activity Group on Geosciences, 1/1/98 – 12/31/00

Newsletter Editor, SIAM Activity Group on Geosciences, 1/1/92 – 12/31/00

Selection Panel, NSF Small Business Innovation Research Program, 9/98

Expert Panel, NSERC (Canada) Networks of Centres of Excellence, 6/98

Selection Panel – Collaborative Research Projects, NSERC (Canada),  
7/1/95 – 6/30/96

Reviewer for DOE proposals in the Applied Mathematics, Geosciences, EPSCOR and  
SBIR programs

Reviewer for NSF proposals in the Mathematical Sciences, SBIR, and CAREER  
programs

Reviewer for NSERC (Canada) proposals in the Mathematical Sciences

Proposal reviewer for the Research Council of Norway

Reviewer for the following journals:

Advances in Water Research, Applied Mathematics Letters, Applied Numerical  
Mathematics, Computational Geosciences, In Situ, J. Stochastic Hydrology,  
J. Computational Physics, J. Differential Equations, J. Geophysical Research,  
Matematica Aplicada e Computacional, J. Nonlinear Analysis, SIAM J. Math-  
ematical Analysis, SIAM J. Scientific Computing, Transport in Porous Media,  
Water Resources Research

## **Consulting**

Petroleum Recovery Research Center, New Mexico Institute of Technology

Brookhaven National Laboratory

Department of Mathematics, University of Iowa

Elf Geosciences Research Center, London

Institute for Energy Technology, Norway

## **Professional Memberships**

American Geophysical Society

American Mathematical Society

American Physical Society

Society for Industrial and Applied Mathematics

Society of Petroleum Engineers

## Teaching

Spring 1996: Developed new course, AMS322 - Groundwater Modeling, as one of the core course offerings in the Applied Environmental Sciences track.

Spring 1996: Developed a new undergraduate track, Applied Environmental Sciences, offered jointly by the Department of Applied Mathematics and Statistics (AMS) and the Marine Science Research Center, and administered by the AMS Department. This is a 71-credit track of required courses leading to a Bachelor of Science in Applied Mathematics.

Fall 1995: Developed new course, AMS321 - Computational Projects in Applied Mathematics, a computer lab-based undergraduate course which introduces sophomores to computational mathematics.

Fall 1992: Developed new course, AMS562 - Numerical Hydrology, a service course for the Geosciences Department's Master of Science in Hydrology program.

Spring 1989: Developed new course, AMS528 - Numerical Analysis III, the third semester course (numerical PDEs) in the AMS graduate computational math curriculum.

## Graduate Students Supervised

Pantaleao da Silva (PhD 1992), Kou-Kung (Alex) Chang (PhD 1993), David Coker (PhD 1993), Dragan Mirkovic (PhD 1993), Sang-Moon Lee (PhD 1995), William Thistleton (PhD 1996), Pawel Dziedzic (MS 1996), Wonho Oh (PhD 1998), Arun Venkatarangan (PhD 2000), Woon-Jae Hwang (PhD 2000), Hyunmi Yang (PhD 2001), Ingrid Koh (PhD 2001), Wei Guo (PhD 2002), Imbunm Kim (PhD 2002), Seungyeon Cho (PhD 2002), Hyunkyung Shin (PhD 2002), Christina Weaver (PhD 2003), Masa Prodanovic, Meungkeun Oh, Adrei Antonenko, Abhishek Datta, Sohae Chung, Firas Daahboul, Hagos Kifle

## Post-doctoral Fellows Supervised

Pantaleao da Silva, Gang Li, Dragan Mirkovic, Felipe Pereira (joint with J. Glimm), Wonho Oh, Woon-Jae Hwang, Ingrid Koh

## University Service

Department

Associate Chair

Executive Committee

Graduate Student Recruitment/Admissions Committee

Faculty and Postdoctoral Fellow Hiring Committees

University

University Senate, President - 2002/04

Vice-President for Engineering and Applied Sciences (CEAS)- 2001/02

Senator for CEAS - 1993, 1995–present

University Senate Undergraduate Council, 1995/96, Chair 1998/99

University Senate Coordinating Council, 1998/99

University Senate Committee for Campus Environment, 1997/98  
Chair, Provost's Steering Committee on Advising, 1999/2001  
CEAS Curriculum and Teaching Policy Committee, 1991–present  
Chair – 1995/96, 1998/99

## References

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