**Complete Curriculum Vitae**

# B BRENT GORDON

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## EDUCATION

Ph.D. (Computer Science) a.b.d., University of Maryland, College Park, *expected 2009*
**M.S.** (Computer Science), University of Maryland, College Park, December 2006
**Ph.D.** (Mathematics), University of Maryland, College Park, May 1984
**M.A.** (Mathematics), University of Cambridge, England, October 1982
**M.A.** (Mathematics), University of Maryland, College Park, May 1980
**B.A.** (Mathematics), University of Cambridge, England, June 1977
**B.A.** *cum laude* (Mathematics), Harvard University, June 1975

*Recent graduate-level study in*: Perceptual Robotics, Planetary Surface Robotics, Robot Motion Planning, Statistical and Neural Pattern Recognition, Advanced Digital Signal Processing, Digital Image Processing, Stochastic Control, Randomized Algorithms, Systems Engineering Principles, Statistical Relational Learning, Artificial Intelligence Planning, Neural Modeling, Approaches to Representing and Recognizing Objects, Computer Processing of Pictoral Information, Parallel Algorithms, Scientific Computing, Neuro-dynamic Programming, Multi-Dimensional and Metric Spaces Databases, Computational Neuroscience, Information-Centric Design of Systems, Image Segmentation, Fast Multipole Methods, Image Understanding, Artificial Life and Evolutionary Computation, Computational Linguistics, Machine Learning, Cognitive Science and Artificial Intelligence.

## EMPLOYMENT

- **Computer Scientist** (April 2007–present), NASA Goddard Space Flight Center, Science and Exploration Directorate, Computational and Information Science and Technology Office. Developing a new, smarter, AI architecture and framework for exploratory vehicles.
- **Graduate Teaching Assistant** (Spring, Fall 2007, 25% FTE), Computer Science Department, University of Maryland. Graded homework for graduate CS courses.
- **Graduate Research Assistant** (2004–2006), Space Systems Laboratory, Department of Aerospace Engineering, University of Maryland. Redesigned Visual Positioning System computer vision algorithms for the Neutral Buoyancy Research Facility.
- **Professor** (2001–2003), **Associate Professor** (1991–2001), **Assistant Professor** (1985–1991), Department of Mathematics, University of Oklahoma. Research: Algebraic Geometry and Number Theory, in particular the geometry and arithmetic of algebraic cycles. Teaching: Calculus and Analytic Geometry, Linear Algebra, Undergraduate and Graduate level Abstract Algebra, Undergraduate and Graduate Number Theory, Undergraduate and Graduate level special topics courses. Administrative Service in numerous professional, university, college and departmental capacities, see below.
- **Program Director** (2000–2002), Division of Mathematical Sciences, National Science Foundation. Managed proposals in Algebra, Number theory and Combinatorics, varied other programs, and related matters.
- **Acting Associate Chair** (1991 August–December, 50% FTE), Department of Mathematics, University of Oklahoma. Supervised the Graduate Teaching Assistants in their capacity as teachers, scheduled all of the department's classes and teaching assignments, and such other duties as the Chair assigned from time to time.
- **Research Assistant Professor** (1984–1985), **Instructor** (1983–1984), Department of Mathematics, Purdue University. Researched and taught similarly as above.

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## VISITING RESEARCH APPOINTMENTS

- **Visiting Professor** (2001 July; 2000 May–June), Department of Mathematics, Kyushu University, Fukuoka, Japan.
- **Visiting Professor** (1998 June–July; 1997 June–July; 1996 June–July, 1994 August–October), Department of Mathematics, University of Leiden, The Netherlands.
- **Visiting Professor** (1995 January–March), School of Mathematics, Tata Institute of Fundamental Research, Bombay, India.
- **Visiting Professor** (1994 October–December), Mehta Research Institute for Mathematics and Mathematical Physics, Allahabad, India.
- **Visiting Professor** (1988 March–June), Centre de Récherches Mathématiques, Montréal, Canada.
- **Visiting Professor** (1986–1987), Mathematical Sciences Research Institute, Berkeley, California.
- **Visiting Scholar** (1983 April–July; 1982 June–July), Max Planck Institute for Mathematics, and Department of Mathematics, University of Bonn, Germany.

## RESEARCH FUNDING

23. **Principal Investigator,** "Short-term Invitational Research Fellowship," Japan Society for the Promotion of Science, travel and per diem expenses in Japanese Yen, the equivalent of about $10,500 (July 2001).
22. **Co-Principal Investigator,** with Roy Joshua of The Ohio State University, "Conference on algebraic cycles," National Security Agency, $9,800 (2000 October – 2001 September).
21. **Principal Investigator,** "Collaborative Investigations into the Arithmetic and Geometry of Algebraic Cycles," University Research Council, University of Oklahoma, $4,942 (October 1998 – June 1999).
20. **Principal Investigator,** "Problems in Algebraic Cycles, Computer Infrastructure Investment Award," University Research Council, University of Oklahoma, with matching funds from the College of Arts and Sciences, $3,000 (1997 December – 1998 February).
19. **Principal Investigator,** "A Conference on the Arithmetic and Geometry of Algebraic Cycles," National Security Agency, $10,398 (1998 February – 1999 February).
18. **Principal Investigator,** "A Conference on the Arithmetic and Geometry of Algebraic Cycles," National Science Foundation (Grant No. DMS–9701013), $15,597 (1997 September – 1988 December).
17. **Co-Principal Investigator,** with James D. Lewis and Noriko Yui, "A Conference on the Arithmetic and Geometry of Algebraic Cycles," North Atlantic Treaty Organization, Scientific Affairs Division, BF3,000,000, the equivalent of about $89,000 US, (1997 March – 1998 December).
16. **Principal Investigator,** "Problems in Chow Groups," U.S. Department of Defense, National Security Agency, Grant No. MDA904–95–1–0004, $23,932 (1996 February – 1998 February).
15. **Principal Investigator,** "Research Travel Funds," University of Oklahoma Graduate College and Research Administration, $500 (1995 July).
14. **Principal Investigator,** "Algebraic Cycles in Kuga-Shimura Varieties, Award in Indian Rupees," National Science Foundation, Grant No. INT–9406779, Rs 150,000, the equivalent of about $4,839 U.S. (1994 August – 1995 July).
13. **Principal Investigator,** "ICM–94 Travel Grant," American Mathematical Society, $1050, for travel to International Congress of Mathematicians 1994, Zürich, (1994 August).
12. **Principal Investigator,** with J.P. Murre, University of Leiden, The Netherlands, "The Chow Groups of Kuga-Shimura Varieties," North Atlantic Treaty Organization, Scientific and Environmental Affairs Division (Collaborative Research Grant CRG931416), Belgian Francs 238,000, the equivalent of about $6,800 U.S. (1994 January – 1995 December).
11. **Principal Investigator,** Group Extensions and Hodge Structures, U.S. Department of Defense, National Security Agency, Grant No. MDA904–92–H–3093, $8,000 (1992 June – 1995 June).
10. **Principal Investigator,** "Motives," University of Oklahoma Graduate College and Research Administration, $584 (1991 July–August)

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9. **Co-Principal Investigator,** with A. Magid, E. Cline, R. Dipper, "Mathematical Sciences Research Equipment," National Science Foundation, $20,000 (1990 July – 1992 December).
8. **Principal Investigator,** "Algebraic and Arithmetic Properties of the Cohomology of Families of Abelian Varieties over Hilbert Modular Surfaces," U.S. Department of Defense, National Security Agency, $30,602 (1989 June – 1991 June).
7. **Principal Investigator,** "Algebraic Cycles in Kuga-Shimura Varieties," University of Oklahoma Graduate College and Research Administration, $2798 (1987 October – 1988 July).
6. **Principal Investigator,** "Algebraic Cycles in Certain Shimura and Kuga-Shimura Varieties," University of Oklahoma Graduate College and Research Administration, $233 (1987 September–October).
5. **Co-Principal Investigator,** with W. Ray, A. Magid, K.-B. Lee, S. Gutman, "Mathematical Sciences Research Equipment," National Science Foundation, $20,000 (1987 July – 1988 December).
4. **Principal Investigator,** "Algebraic Cycles in Motives over Modular Surfaces," The James M. Vaughn, Jr. Foundation Fund, $5000, 1987 January – 1987 July.
3. **Principal Investigator,** "Algebraic Cycles in Motives over Modular Surfaces," Oklahoma State University, National Science Foundation, EPSCoR program, $12,955 (1986 October – 1989 March).
2. **Principal Investigator,** "Algebraic Cycles in Motives over Modular Surfaces," University of Oklahoma College of Arts and Sciences Summer Research Fellowship, $3000 (1986 Summer).
1. **Principal Investigator,** "Algebraic Cycles in Motives over Modular Surfaces," University of Oklahoma Graduate College and Research Administration, $5000 (1985 November – 1986 December).

## PUBLICATIONS

### Refereed articles in archival journals

12. with Masaki Hanamura and Jacob P. Murre, *Absolute Chow-Künneth projectors for modular varieties,* Journal für die reine und angewandte Mathematik **580** (2005), 139–155. [17pp.]
11. with Masaki Hanamura and Jacob P. Murre, *Relative Chow-Künneth projectors for modular varieties,* Journal für die reine und angewandte Mathematik **558** (2003), 1–14. [14pp.]
10. with Masaki Hanamura and Jacob P. Murre, *Chow-Künneth projectors for modular varieties,* C. R. Math. Acad. Sci. Paris **335** (2002), 745–750. [6pp.]
9. with Jacob P. Murre, *Chow motives of elliptic modular threefolds,* Journal für die reine und angewandte Mathematik **514** (1999), 145–164. [20pp.]
8. with Kirti Joshi, *Griffiths groups of supersingular abelian varieties.* Canadian Mathematical Bulletin **45** (2002), 213–219. [7pp.]
7. with James D. Lewis, *Indecomposable higher Chow cycles on products of elliptic curves,* Journal of Algebraic Geometry **8** (1999), 543–567. [25pp.]
6. *Algebraic cycles in families of abelian varieties over Hilbert-Blumenthal surfaces,* Journal für die reine und angewandte Mathematik **449** (1994), 149–171. [23pp.]
5. *Intersections of higher weight cycles and modular forms,* Compositio Mathematica **89** (1993), 1–44. [44pp.]
4. *Algebraic cycles and the Hodge structure of a Kuga fiber variety,* Transactions of the American Mathematical Society **336** (1993), 933–947. [15pp.]
3. *Topological and algebraic cycles in Kuga-Shimura varieties,* Mathematische Annalen **279** (1988), 395–402. [8pp.]
2. *Algebraically defined subspaces in the cohomology of a Kuga fiber variety,* Pacific Journal of Mathematics **131** (1988), 261–276. [16pp.]
1. *Intersections of higher weight cycles over quaternionic modular surfaces and modular forms of Nebentypus,* Bulletin of the American Mathematical Society **14** (1986), 293–298. [6pp.]

### Refereed articles in conference proceedings

3. *Autonomous Robots with Both Body and Behavior Self-Knowledge,* in Performance Metrics for Intelligent Systems Workshop, August, 2007. [8pp.]

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2. with James D. Lewis, *Indecomposable higher Chow cycles,* in The Arithmetic and Geometry of Algebraic Cycles: Proceedings of the NATO Advanced Study Institute held as part of the 1998 CRM Summer School at Banff, AB, June 7–19, 1998, NATO Science Series C: Mathematical and Physical Sciences, vol. 548, Dordrecht: Kluwer Academic Publishers, 2000, pp. 193–224. [32pp.]
1. *Algebraic cycles of higher weight and modular forms,* in Number Theory (Montréal, Québec, 1985), Canadian Mathematical Society Conference Proceedings, vol. 7, Providence, RI: American Mathematical Society, 1987, pp. 75–82. [8pp.]

**Invited articles**

1. *Baily-Borel compactifications,* in "Encyclopaedia of Mathematics, Supplement III," Kluwer Academic Publishers, Dordrecht, The Netherlands, 2002. [2pp]

**Books**

2. **co-editor** with James D. Lewis, Stefan Müller-Stach, Shuji Saito and Noriko Yui, *The arithmetic and geometry of algebraic cycles. Proceedings of the NATO Advanced Study Institute held as part of the 1998 CRM Summer School at Banff, Alberta, June 7–19, 1998,* NATO Science Series C: Mathematical and Physical Sciences, vol. 548, Kluwer Academic Publishers, Dordrecht, 2000.
1. **co-editor** with James D. Lewis, Stefan Müller-Stach, Shuji Saito and Noriko Yui, *The arithmetic and geometry of algebraic cycles: Proceedings of the CRM Summer School held in Banff, Alberta, June 7–19, 1998,* CRM Proceedings and Lecture Notes, vol. 24, Providence, RI: American Mathematical Society, 2000.

**Refereed book chapters**

1. *Canonical models of Picard modular surfaces,* in "The Zeta Functions of Picard Modular Surfaces," ed. R. Langlands, D. Ramakrishnan, Publications Centre de Recherches Mathématiques, Université de Montréal, 1992, pp. 1–29. [29pp.]

**Invited book chapters**

1. *Appendix B: A Survey of the Hodge Conjecture for Abelian Varieties,* in "A Survey of the Hodge Conjecture, Second Edition," by James D. Lewis, Publications Centre de Recherches Mathématiques, Montréal, vol. 10, American Mathematical Society, Providence, Rhode Island, 1999, pp. 297–356. [60pp.]

## INVITED PRESENTATIONS

Computer Science (artificial intelligence, robotics, computer vision) Presentations

52. *Panel Discussion on (Re-)Establishing or Increasing Collaborative Links Between Artificial Intelligence and Intelligent Systems,* Performance Metrics for Intelligent Systems Workshop, August 2007, Panel Discussion organizer and moderator.
51. *Things to think about if you are thinking about designing, building, or developing cognitive autonomous robots,* Maryland AI Day, 27 April 2007, Poster session.

Mathematical Lectures

50. *Motives and the motivation for them,* Colloquium, Department of Mathematics and Statistics, Miami University of Ohio, Miami, Ohio, 20 September 2001.
49. *Algebraic cycles on a product of Hilbert modular surfaces,* Number Theory Seminar, Kyushu University, Fukuoka, Japan, 9 June, 2000.
48. *Algebraic cycles on a product of Hilbert modular surfaces,* Algebraic Geometry Seminar, The Ohio State University, Columbus, Ohio, 9 May, 2000.
47. *The Fourier transform in algebraic geometry,* Colloquium, University of Arizona, 21 October, 1999.
46. *Algebraic cycles on a product of Hilbert modular surfaces,* Workshop on Arithmetical Algebraic Geometry, Centre de recherches mathématiques, Montréal, May 1999; invited speaker.
45. *Indecomposable cycles on products of elliptic curves,* Algebraic Geometry Seminar, The Ohio State University, Columbus, Ohio, 27 January 1999.

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44. *Chow-Künneth decompositions for some degenerating families of abelian varieties,* Mini-Workshop on the Arithmetic and Geometry of Algebraic Cycles, CRM Montréal Chapter, Centre de recherches mathématiques, Montréal, 27 November 1998; invited speaker.
43. *Indecomposable higher Chow cycles on products of elliptic curves,* NATO Advanced Study Institute and CRM Summer School on the Arithmetic and Geometry of Algebraic Cycles, Banff, Alberta, June 1998; plenary speaker.
42. *Chow motives of elliptic modular varieties,* Number Theory Seminar, University of Arizona, Tucson, Arizona, 18 November 1997.
41. *Just what are motives, and what are they good for, anyway?,* TCU Research Lecture Series, Texas Christian University, Fort Worth, Texas, 28 October 1997.
40. *Understanding the Chow motive structure of elliptic modular varieties,* Algebraic Geometry Seminar, The Ohio State University, Columbus, Ohio, 19 February 1997.
39. *Chow groups of Kuga-Shimura varieties,* Special Session on Arithmetical Algebraic Geometry, American Mathematical Society meeting, Kent, Ohio, 3 November 1995.
38. *Algebraic cycles over modular surfaces,* Mathematics Colloquium, Macquarie University, Sydney, Australia, 5 June 1995.
37. *Modular forms and algebraic cycles,* Joint Sydney University - University of New South Wales Mathematics Colloquium, Sydney, Australia, 2 June 1995.
36. *Algebraic varieties and modular forms,* Mathematics Colloquium, Institut Teknologi Bandung, Bandung, Indonesia, 8 May 1995.
35. *Number theory and modular forms,* Mathematics Colloquium, Kasetsart University, Bangkok, Thailand, 24 April 1995.
34. *Group-theoretic families of abelian varieties: A confluence of group theory, number theory and algebraic geometry,* Graduate Student Survey Lecture, The Chinese University of Hong Kong, Hong Kong, 20 April 1995.
33. *Algebraic cycles and Hilbert modular forms,* Mathematics Colloquium, The Chinese University of Hong Kong, Hong Kong, 19 April 1995.
32. *On families of elliptic curves,* Mathematics Colloquium, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia, 15 April 1995.
31. *Generating functions for intersections of modular curves,* Mathematics Colloquium, Universiti Pertanian Malaysia, Selangor, Malaysia, 13 April 1995.
30. *Algebraic cycles on modular abelian schemes,* Algebra Seminar, National University of Singapore, Singapore, 4 April 1995.
29. *Group-theoretic families of abelian varieties,* a series of five lectures, Tata Insititue of Fundamental Research, January and February 1995.
28. *The Hodge conjecture, motives, and families of abelian varieties,* Mathematics Colloquium, Birla Institute of Science and Technology, Pilani, Rajasthan, India, November 1994.
27. *Hilbert modular varieties,* a series of six lectures, Mehta Research Insitute for Mathematics and Mathematical Physics, November and December 1994.
26. *Motives for families of abelian varieties,* Algebraic Geometry Seminar, Catholic University of Leuven, Belgium, October 1994.
25. *On the Hodge and Tate conjectures for Hilbert modular forms,* Special Algebraic Geometry Seminar, University of Leiden, The Netherlands, August 1994.
24. *Algebraic cycles in Kuga varieties,* Number Theory Seminar, California Institute of Technology, March 1994.
23. *Algebraic cycles in families of abelian varieties over Hilbert-Blumenthal surfaces,* Special Session on Arithmetical Algebraic Geometry, American Mathematical Society meeting, Jan. 1991.
22. *Families of Abelian varieties over modular curves, the generalized Tate conjecture, and ordinary primes for modular forms,* Special Session on Algebraic Geometry, American Mathematical Society meeting, Nov. 1990.
21. *An algebraic realization of the cohomology of a Hilbert modular variety,* Special Session on Arithmetic Groups, American Mathematical Society meeting, Nov. 1990.
20. *Algebraic cycles on the universal abelian surface over a Hilbert modular surface,* Special Lecture, California Institute of Technology, Nov. 1989.

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19. *On the Hodge structure of a Kuga variety,* Colloquium, California State University, San Bernardino, 1989 November.
18. *Algebraic cycles in the cohomology of a Kuga variety,* Special Session on Algebraic Geometry, American Mathematical Society meeting, 1988.
17. *Algebraic cycles in a Kuga variety,* Number Theory Seminar, University of Maryland, 1988.
16. *Algebraic cycles in a Kuga variety,* Twentieth Ohio State – Denison Mathematics Conference, 1988.
15. *Algebraic cycles in Kuga-Shimura varieties,* Number Theory Seminar, Boston University, 1987.
14. *Algebraic cycles in Kuga-Shimura varieties,* Colloquium, Rutgers University, Newark, 1987.
13. *Algebraic cycles in families of abelian varieties,* Conference International de Théorie de Nombres, Québec, 1987.
12. *The generalized Hodge conjecture for families of abelian varieties,* Algebraic Geometry Seminar, University of California, Berkeley, 1987.
11. *Torus actions on the Grassmann complex,* Motivic Cohomology Seminar, Mathematical Sciences Research Institute, Berkeley, 1987.
10. *Intersections of higher weight cycles and modular forms,* Automorphic Forms Seminar, Mathematical Sciences Research Institute, Berkeley, 1986.
9. *Algebraic and topological cycles in Kuga fiber varieties,* Number Theory Seminar, Oklahoma State University, 1986.
8. *Algebraic cycles of higher weight and modular forms,* Canadian Mathematical Society Number Theory Seminar, Montréal, 1985.
7. *Intersections of higher weight cycles and modular forms,* Colloquium, University of California, Santa Cruz, 1985.
6. *Intersections of higher weight cycles and modular forms,* Colloquium, University of Oklahoma, 1985.
5. *Algebraic cycles of higher weight,* The Johns Hopkins University, 1984.
4. *Algebraic cycles of higher weight,* Harmonic Analysis and Automorphic Representations Seminar, Ohio State University, 1984.
3. *On certain algebraic cycles in group-theoretic families of abelian varieties,* Hirzebruch Algebraic Geometry Lunch, Max-Planck-Institut für Mathematik, Bonn, 1983.
2. *Kuga fiber varieties, intersection numbers and Siegel modular forms,* Special Session on Representation Theory and Automorphic Forms, American Mathematical Society meeting, 1982.
1. *Intersection of cycles in Kuga fiber varieties and modular forms,* Hirzebruch-Harder Oberseminar, Max-Planck-Institut für Mathematik, Bonn, 1982.

## ADMINISTRATIVE AND PROFESSIONAL SERVICE

**Professional**

- **Conference Program Committee**
  - Industrial Conference on Data Mining 2008, Liepzig, Germany, July 2008.
- **Conference Co-organizer**
  - with R. Joshua, of the Conference on Algebraic Cycles, 1–3 December 2000, in Columbus, Ohio (1999–2000).
  - with J. Lewis and N. Yui, of the NATO Advanced Study Institute – 1998 CRM Summer School on the Arithmetic and Geometry of Algebraic Cycles, Banff, 7–19 June 1998 (1996–1999).
- **Grant Proposal Reviewer**
  - for the U.S. National Science Foundation (1985, 1991, 1994, 1997–2000).
  - for the U.S. National Security Agency (1994–1995).
  - for the (South) Korea Science and Engineering Foundation (1995).
- **Referee for Journal**
  - for Indagationes Mathematicae (2000).
  - for Journal für die reine und angewandte Mathematik (2000).
  - for Compositio Mathematica (1999).
  - for Illinois Journal of Mathematics (1992, 1995–1996) .

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**University of Oklahoma**

- Computer Advisory Committee (1999–2000), College of Arts and Sciences.
- Academic Appeals and Misconduct Committee (1998–2000), College of Arts and Sciences.
- **Chair,** Graduate Teaching Assistant Awards for Engineering and Physical Sciences Evaluation Committee (1996), Graduate College.
- Ph.D. Dissertation Prize Subcommittee for Engineering and Physical Sciences (1994), Graduate College.
- **Chair,** Faculty Compensation Committee (1992–1994), Norman Campus Faculty Senate.
- Small Executive Committee (1992–1994), Norman Campus Faculty Senate.
- **Elected Senator** (1992–1994), Norman Campus Faculty Senate.
- Assessment Implementation Committee (1991–1994).
- Faculty Speakers Service (1991–1993).
- University Libraries Committee (1990–1993).
- Organizer and founder (1990–1992), Faculty Singles Organization.
- University Libraries *ad hoc* Serials Review Committee (1990–1991).
- Recreational Services Advisory Committee (1989–1991).

**Department of Mathematics, University of Oklahoma**

- *Ad Hoc* Committee to Revise the Departmental Teaching Self-Evaluation Form (2000).
- **Chair,** Faculty Search Committee (1996–1997). First to apply database tools.
- Computer Committee (1995, 1997–1999).
- Scheduling of all faculty and graduate student teaching assignments (1992–1994). First to apply database tools.
- Social Committee (1992–1993).
- Karcher Endowment Colloquium Committee (1987, 1989–1993). Brought first automatic (email) electronic announcement system to department, in pre-WWW years.
- **Coordinator,** Mathematics Awareness Week activities, and designated department Media Contact Person (1988–1989).
- **Chair** (1988–1991), member (1987–1991), Library Committee.
- Faculty Search Committee (1985–1991).

## PROFESSIONAL ORGANIZATIONS

- Association for the Advancement of Artificial Intelligence (AAAI), known until 2007 as the American Association for Artificial Intelligence (since 2002).
- Association for Computing Machinery (ACM), and some of its special interest groups (since 2002).
- IEEE, and some of its constituent societies (since 2002).
- American Mathematical Society (AMS) (since 1980). A professional organization for research and scholarship in mathematics.
- **Life Member,** Cambridge Philosophical Society (since 1977). One of the world's oldest scientific societies.