

# Curriculum Vita

James A. Carlson

Updated April 23, 2013

## Personal information

Birthdate: November 14, 1946

Birthplace: Lewiston, Idaho

[jxxcarlson@mac.com](mailto:jxxcarlson@mac.com)

[www.math.utah.edu/~carlson](http://www.math.utah.edu/~carlson)

4242 Gavin Lane

Columbus, OH 43220

25 Murray Street, Apartment 7G

New York, NY 10007

## Academic Degrees

B. S. 1967, University of Idaho (Mathematics)

Ph.D. 1971, Princeton University (Mathematics)

## Academic Positions

1971–73 Assistant Professor, Stanford University

1973–75 Assistant Professor, Brandeis University

1975–78 Assistant Professor, University of Utah

1978–85 Associate Professor, University of Utah

1985–2006 Professor, University of Utah

1995–2002 Department Chair, University of Utah  
2006– Professor Emeritus, University of Utah  
2003–2012 President, Clay Mathematics Institute

## Grants and Fellowships, and Honors.

1967 Woodrow Wilson Fellowship (declined)  
1967–71 National Science Foundation Graduate Fellowship  
1977–78 Fellow, Sloan Foundation  
1978 David P. Gardner Fellowship  
1971–79 Faculty Associate, N.S.F. Grant  
1980– Principal Investigator, N.S.F. Grant  
1995–2003 Associate Editor, Journal of Geometric Analysis  
2001– 2003 co-PI, VIGRE Grant, University of Utah  
2011 Member of AAAS

## Books authored or edited

1. *The Millennium Prize Problem*, James Carlson, Arthur Jaffe, and Andrew Wiles, eds., 165 pp., 2006 (AMS).
2. *Geometry of the Period Map*, (with Chris Peters and Stefan Mueller-Stach), Cambridge University Press, 2003, pp 559.
3. *Symposium in Honor of C. H. Clemens*, Aaron Bertram, James A. Carlson, Holger Kley, eds., *Contemporary Mathematics*, **312**, American Mathematical Society, 2002, pp 291.
4. *Multivariable Mathematics with Maple: linear algebra, vector calculus, and differential equations*, J. Carlson and J. Johnson, Prentice Hall, 1996.
5. *Complex Geometry and Lie Theory* (Proceedings of Symposia in Pure Mathematics, vol 53), J. Carlson, C. H. Clemens, and D. Morrison, eds., Am. Math. Soc., 1992.

## Expository Articles

1. J. Carlson, Period Domains and Period Mappings (Trieste Lectures), 35 pp, editing final version for publication in *Annals of Mathematics Studies*, Princeton University Press.

2. J. Carlson, M. Green, and P. Griffiths, Variations Of Hodge Structure Considered As An Exterior Differential System: Old And New Results, *SIGMA* 5 (2009), 087, 40 pages (<http://www.emis.de/journals/SIGMA/2009/087/>)
3. J. Carlson and P. Griffiths, What is ... a Period Domain, *Notices of the American Mathematical Society*, December 2008, pp. 1418-1419.

## Research Articles

1. J.A. Carlson and D. Toledo, Compact quotients of non-classical domains are not Kähler, 7 pp, submitted. ,
2. J. A. Carlson and D. Toledo, Cubic Surfaces with Special Periods, *Proc. Amer. Math. Soc.* 141 (2013), 1947-1962.
3. D. Allcock, J. A. Carlson and D. Toledo, The moduli space of cubic threefolds as a ball quotient, *math.AG/0608287*, 70 pp, *Memoirs of the AMS*, 985, January, 2011.
4. D. Allcock, J. A. Carlson and D. Toledo, Hyperbolic geometry and moduli of real cubic surfaces, 53 pp., [arxiv.org/abs/0707.1058v1](http://arxiv.org/abs/0707.1058v1), *Ann. Scient. de l'École Normale Supérieure*, 43, no 1 (2010) 69–115.
5. D. Allcock, J. A. Carlson and D. Toledo, Hyperbolic geometry and the moduli space of real binary sextics. *Arithmetic and geometry around hypergeometric functions*, 1–22, *Progr. Math.*, 260, Birkhäuser, Basel, 2007
6. D. Allcock, J. A. Carlson and D. Toledo, Nonarithmetic uniformization of some real moduli spaces. *Geom. Dedicata* 122 (2006), 159–169.
7. J. Carlson and D. Toledo, Generic integral manifolds for weight two period domains. *Trans. Amer. Math. Soc.* 356 (2004), no. 6, 2241–2249
8. Real Cubic surfaces and real hyperbolic geometry (with Daniel Allcock and Domingo Toledo), *C. R. Acad. . Paris, Ser I337* (2003) 185-188. ([arXiv:math.AG/0303374](http://arXiv:math.AG/0303374))
9. The complex hyperbolic geometry of the moduli space of cubic surfaces (with Daniel Allcock and Domingo Toledo), *J. Algebraic Geom.* 11 (2002), 659-724. ([math.AG/0007048](http://math.AG/0007048))
10. Orthogonal Complex Hyperplane Arrangements, pp 10; with Daniel Allcock and Domingo Toledo, in *Symposium in Honor of C. H. Clemens*, Aaron Bertram, James A. Carlson, Holger Kley, eds., *Contemporary Mathematics*, **312**, American Mathematical Society, 2002, pp 1-8 ([www.math.utah/~carlson/eprints](http://www.math.utah/~carlson/eprints))
11. Discriminant Complements and Kernels of Monodromy Representations (with Domingo Toledo), *Duke J. of Math.* **97**, 1999, 621–648. ([alg-geom/9708002](http://alg-geom/9708002))

12. Complex Hyperbolic Structure for Moduli of Cubic Surfaces (with Daniel Allcock and Domingo Toledo). *C. R. Acad. Sci. Paris*, t. **326**, ser I, pp 49–54, 1998 (alg-geom/970916)
13. On Fundamental Groups of Class Seven Surfaces (with Domingo Toledo). *Bull. London Math. Soc.* **29** (1997), no. 1, 98–102.
14. Quadratic Presentations and Nilpotent Kähler Groups (with Domingo Toledo). *J. Geom. Analysis* **5** (1995) 359–377.
15. Rigidity of harmonic maps from Kähler manifolds to classical locally symmetric spaces (with Domingo Toledo), 30 pp., *J. Geom. Analysis* 1993.
16. Harmonic maps from compact Kähler manifolds to exceptional hyperbolic spaces (with Luis Hernández), *J. Geom. Analysis* **1** (1991), 339–357.
17. Hypersurface variations are maximal, II, *Trans. AMS* **323** (1991), 177–196.
18. Harmonic mappings of Kähler manifolds to locally symmetric spaces (with Domingo Toledo), *Publ. Math. I.H.E.S.* **69** (1989) 173–201.
19. Variations of Hodge structure of maximal dimension (with Domingo Toledo and Aznif Kasparian), *Duke Journal of Math* **58** (1989) 669–694.
20. Extensions of variations of Mixed Hodge Structures (with Richard Hain), 22 pp., *Astérisque* 179-80 (1989), *Société Mathématique de France*, pp 39-66.
21. Variations of Hodge structure, Legendre submanifolds, and Accessibility (with Domingo Toledo), *Trans. AMS* 311 (1989) 391–411.
22. Integral Manifolds, Harmonic Mappings, and the Abelian Subspace Problem (with Domingo Toledo), *Algebra: Some Current Trends*, L.L. Avramov and K.B. Tchakerian, eds., Springer Verlag Lecture Notes in Mathematics 1352 (1988), 60–74.
23. The geometry of the extension class of a mixed Hodge structure, *Proc. Symp. Pure Math.* **46**, Part 2 (1987), 199–222.
24. Hypersurface variations are maximal, I (with Ron Donagi), *Inventiones Math.* **89** (1987), 371–374.
25. Shimura varieties of weight two Hodge structures (with Carlos Simpson), *Hodge Theory*, Springer-Verlag LNM 1246 (1987) 1–15.
26. Bounds on the dimension of variations of Hodge structures, *Trans. AMS* **294** (1986) 45–64, Erratum *Trans AMS*, **299** (1987) p. 429.

27. Polyhedral resolutions of algebraic varieties, *Trans. AMS* **292** (1985), 595–612.
28. The one-motif of an algebraic surface, *Compositio Math.* **56** (1985), 271–314.
29. Infinitesimal variations of Hodge structures (with M. Green, P. A. Griffiths, and J. Harris) *Compositio Math.* **50** (1983), 109–205.
30. The mixed Hodge structure associated to  $\pi_3$  of a simply connected threefold (with C. H. Clemens and J. Morgan), *Ann. Scient. Ec. Norm. Sup., serie 4C* **14** (1981), 1–16.
31. Infinitesimal variations of Hodge structure and the global Torelli problem (with P. A. Griffiths), *Journées de Géométrie Algébrique D'Angers 1979*, Sijthoff Nordhoff, Alphen an den Rijn, the Netherlands (1980), 51–76.
32. Mixed Hodge structures and compactifications of Siegel's space (with E. Cattani and A. Kaplan), *Journées de Géométrie Algébrique d'Angers 1979*, Sijthoff Nordhoff, Alphen an den Rijn, the Netherlands (1980), 77–106.
33. Extensions of mixed Hodge structures, *Journées de Géométrie Algébrique d'Angers 1979*, Sijthoff Nordhoff, Alphen an den Rijn, the Netherlands (1980)
34. A result on the value distribution of holomorphic maps from  $\mathbf{C}^n$  to  $\mathbf{C}^n$ , *Proceedings of Symposia in Pure Mathematics* **30** (1977), AMS, Providence, Rhode Island, 225–227.
35. A remark on the universal cover of a Moishezon space, (with Reese Harvey), *Duke Journal of Mathematics* **43** (1976), 497–500.
36. A moving lemma for the transcendental Bezout problem, *Ann. of Math.* **103** (1976), 305–330.
37. A Picard theorem for holomorphic curves in the plane (with Mark Green), *Duke Journal of Mathematics* **43** (1976), 1–9.
38. The order functions for entire holomorphic mappings (with P. A. Griffiths), *Value Distribution Theory*, Kujala and Vitter, eds., Marcel Dekker, New York (1974), 225–248.
39. A remark on the transcendental Bezout problem, *Value Distribution Theory*, Kujala and Vitter, eds, Marcel Dekker, New York (1974), 133–143.
40. On the maximum principle for the Tangential Cauchy-Riemann equations (with C. D. Hill), *Math. Ann.* **208** (1974), 91–97
41. A defect relation for holomorphic mappings between algebraic varieties (with P. A. Griffiths), *Ann. of Math.* **95** (1973) 577–584

42. Some degeneracy theorems for entire functions with values in an algebraic variety, *Trans. AMS* **168** (1972), 273–301

## Other recent professional activities

### Advisory and Editorial Boards

Project Euclid (Cornell University) 2009 – 2011

Princeton University Mathematics Department, 2006-2010, 2010-2014.

SIGMA (Symmetry, Integrability and Geometry: Methods and Applications)

### External Evaluation Committees

1. CIMAT, Guanajuato, Mexico, February 2009–13.
2. CIMAT (Centro de Investigaciones en Matematicas), Guanajuato, Mexico, February 28-29, 2008.
3. KIAS, Seoul Korea
4. Mathematics Department, University of Massachusetts, Amherst, MA.
5. AIM, Palo Alto, California.

### Selected talks and research visits since 1999

1. KIAS, Seoul, Korea, May 7 2013: *Number fields and periods of cubic threefolds*
2. Intensive Hodge theory course, BICMR – Beijing International Center for Mathematical Research, Peking University, April 18 - March 5, 2013.
3. Number theory seminar, Columbia/CUNY/NYU, April 25, 2013: *Number fields and periods of cubic threefolds*
4. Algebraic geometry seminar, Ohio State University, January 22, 2013: *Number fields and periods of cubic threefolds*
5. Algebraic geometry seminar, University of Utah, November 28, 2012: *Number fields and periods of cubic threefolds*
6. Algebraic geometry seminar, NYU, November 13, 2012: *The field of periods for doubly cyclic cubic threefolds* .
7. CIMAT, June 2010, Four lectures on periods and transcendence.

8. Institut Henri Poincaré, June 2010, The Poincaré Conjecture (for Lycée students)
9. Instituto Tecnológico de Monterey, Leon, March 2010. Grand Challenges in Mathematics
10. Public Lecture, BYU, February 2010. Grand Challenges in Mathematics.
11. CIMAT, October 2010. Three lectures on elliptic curves and modular functions.
12. Invited lecture on the Millennium problems at ESOF (EuroScience Open Forum) Torino, Italy, July 2, 2010.
13. One week of lectures on period mappings at the conference on Hodge theory at ICTP, Trieste, June 14 - July 2, 2010; One research lecture on cubic surfaces with special periods.
14. University of Utah Algebraic Geometry Seminar. Hodge theory and Galois theory of cubic surfaces, September 29, 2009.
15. Poincaré and Grothendieck Residues (two talks), September 24; Richard Mayer's work on maximal variations of Hodge structure, September 25, 2009; CIMAT.
16. Varieties with periods in a number field, CIMAT, April 27, 2009.
17. Integral manifolds and variations of Hodge structure, two talks at CIMAT, April 23-24, 2009.
18. Numbers, patterns, and primes (public lecture), RIMS, Kyoto, March 2, 2009.
19. The Galois Group of a Cubic Surface, CIMAT, Guanajuato, Mexico, November 3, 2008.
20. Speculations on Cubic Surfaces, Institute for Advanced Study, Princeton, New Jersey, October 16, 2008
21. Claire Voisin's Counterexample to the Kodaira Conjecture, CIMAT, Guanajuato, Mexico, October 8-9, 2008.
22. Short course on computational methods in algebraic geometry, CIMAT, Guanajuato, Mexico, Feb 7-8, March 3, 2008.
23. Moduli of cubic threefolds as a ball quotient, Mark Green's birthday conference, UCLA, Feb 22, 2008
24. Mathematics of Google, University of Utah High School Summer Program, June 25, 2007.

25. September 26, 2006. Grand Challenges in Mathematics, talk to 80 Tulane University freshman as part of program on grand challenges in mathematics, science, and engineering.
26. July 17, 2006. Grand Challenges in Mathematics, European Open Science Forum (ESOF), Munich, Germany. Audience of scientists and science journalists.
27. May 2, 2006. The moduli space of cubic threefolds as a ball quotient, Conference in honor of John Morgan, Columbia University.
28. March 28, 2006. The moduli space of cubic threefolds as a ball quotient, Conference in honor of Domingo Toledo, University of Utah.
29. February 18, 2006. Grand Challenges in Mathematics, AAAS National Meeting, St. Louis, Missouri. Audience of scientists and science journalists.
30. October 27, 2005. Invited address, Joint meeting of the American Mathematical Society and the Sociedad Matematica Mexicana., Mexico City: Cubic equations and hyperbolic geometry.
31. October 21, 2005. (a) Colloquium at Tufts University: Cubic equations and hyperbolic geometry. (b) Talk to undergraduate math club: The Mathematics of Google.
32. November 17, 2004, University of Pennsylvania, Colloquium: Volumes of of the moduli space of real cubic surfaces
33. November 10, 2004, Worcester Polytechnic Institute: Colloquium talk on prize problems and the Riemann hypothesis; Undergraduate talk on the mathematics of Google
34. October 28, 2004, University of Massachusetts: Volumes of of the moduli space of real cubic surfaces
35. October 24, 2004, Undergraduate Math Club: Mathematics of Google.
36. March 10–11, 2004, University of Miami Spring Workshop: Hyperbolic Structures on Moduli of Cubic Surfaces
37. February 26, 2004, Instituto Tecnológico de Monterrey, Leon, Mexico: The Mathematics of Google (expository talk for undergraduates)
38. November 20, 2004, Hong Kong University, invited talk at conference in honor of Yum-Tong Siu (Nov 19-23): Volume of the space of real cubic surfaces.
39. October 9, 2003, Colloquium, University of Miami: the Riemann Hypothesis.
40. September 9, 2003, MIT, Algebraic Geometry Seminar: Volume of the space of real cubic surfaces

41. March 3, 2003, Princeton University, Algebraic Geometry Seminar: Real cubic surfaces and real hyperbolic geometry.
42. February 24, 2003, Miami University, Colloquium: Real cubic surfaces and real hyperbolic geometry.
43. September 2003, University of Texas, Austin. New results on moduli of quartic curves. Part of an invited one-month research visit.
44. February 2002, Tulane University. (1) Undergraduate colloquium on mathematical methods in Babylonian astronomy, (2) Colloquium on Hodge theory and complex hyperbolic geometry
45. November, 2001, Institut Fourier, Grénoble. New results on cubic hypersurfaces. Part of one-month invited research visit.
46. December 6, 2000, Princeton University, Algebraic Geometry Seminar, Moduli of stable cubic surfaces
47. April 14-21, 2000, One week series of lectures on Hodge theory at the University of Arizona
48. January, 2000, University of Hong Kong, Moduli of stable cubic surfaces; part of two-week invited visit.
49. November, 1999, Columbia University, Colloquium on moduli of stable cubic surfaces
50. May, 1999, Institut Fourier, Grenoble. Moduli of stable cubic surfaces; part of one-month invited visit.

## **Education – Undergraduate and Graduate**

1. Developed University of Utah Mathematics Department's Scientific Computing with C course (Mathematics 2160).
2. Developed online version of Department's Number Theory course (Mathematics 4400).
3. Developed and taught history of mathematics course (1998–2002)
4. Served on university committee to establish departmental honors programs. These began operation in the spring of 2002. The mathematics program was the first to be approved.
5. Developed, directed, and taught class in the Department's summer program in mathematics for high school students. Has run for the last four summers (2000 – 2003). Three week session, Monday through Thursday, 8:30 am – 4:30 pm. ([www.math.utah.edu/hsp/](http://www.math.utah.edu/hsp/))

6. Led committee which over a two-year period formulated the University of Utah's successful VIGRE grant application.
7. VIGRE REU on Knot theory with Domingo Toledo and graduate students Martin Deraux and Bobby Hanson. Summer 2001.
8. VIGRE Minicourse on complex hyperbolic geometry with Domingo Toledo and Richard Schwartz, May 2002

## Miscellaneous

1. Fall 2003: Initiated project with Octavo.com and the Bodleian Library, Oxford, to digitize the oldest surviving manuscript of Euclid's elements (Constantinople, 888 AD). Completed November, 2004.
2. Committees: AMS-IMS-SIAM Summer Research Conference Advisory Panel (2004)
3. Refereeing
4. NSF panels
5. Consultant 1999-2002 with Artist Anna Bliss on public art project for the new mathematics building. Also contributed one plate to her project (a computer-generated image of a tiling of hyperbolic space by ideal triangles).
6. Led the Department's effort to design, and remodel the new mathematics building, and to design and construct the student mathematics center and plaza.
7. Worked with the Dean of Science, Peter Stang, and his Development Officer, David Mortensen, to obtain funding for the Warnock Chair (\$1.5 million). This was the first endowed chair in the Mathematics Department at the University of Utah.
8. Worked with the Dean of Science, Peter Stang, and his Development Officer, David Mortensen, to obtain funding from the George S. and Dolores Doré Eccles Foundation for Math Center (\$1.7 million), to obtain funding for the library renovation project from the R. Harold Burton Foundation, and to obtain seed funding for the attic renovation.

## Selected initiatives at the Clay Mathematics Institute

1. Organized an international conference in Paris, June 2010 to celebrate award of the first Millennium Prize in Mathematics (for solution of the Poincaré conjecture).

2. Initiated support for individual researchers verifying the Poincaré conjecture, organized a five-day workshop at Princeton to the same end.
3. Digitization of the oldest extant version of Euclid's Elements (Byzantium, 888 AD). See <http://www.claymath.org/library/historical/>
4. Digitization of the Protokolle of Felix Klein (record of his seminar in Goettingen, 1872-1912. See <http://www.claymath.org/library/historical/>
5. New format for annual meeting: a two-day conference on current research advances à la Seminaire Bourbaki.
6. Program of in-house workshops.