Vita

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Education

College of the Holy Cross, A.B., 1968

Brown University, Ph.D., 1973 (thesis advisor - K. Nomizu)

Regular Academic Positions

1. Vassar College, Assistant Professor, 1973–78

2. College of the Holy Cross, Assistant Professor 1978–81,
   Associate Professor 1981–86, Professor 1986 – 2020,
   Professor Emeritus 2020 – present

Visiting Academic Positions

1. University of Notre Dame, Visiting Professor, 1976–77

2. University of California, Berkeley, Visiting Professor, Spring, 1986

3. Brown University, Research Associate, 1982–1983, 1992–1993, 1999–2000

Books

1. T.E. Cecil and P.J. Ryan, *Tight and Taut Immersions of Manifolds*, Research Notes in Math. **107**, Pitman, Boston, 1985.

2. T.E. Cecil, *Lie Sphere Geometry*, First Edition, Springer, New York, 1992.

3. T.E. Cecil, *Lie Sphere Geometry*, Second Edition, Springer, New York, 2008.

4. T.E. Cecil and S.-S. Chern, *Tight and Taut Submanifolds*, T.E. Cecil and S.-S. Chern, editors, MSRI Publications **32**, Cambridge Univ. Press, 1997.

5. T.E. Cecil, *Lie Sphere Geometry and Dupin Hypersurfaces*, Escola Altos Estudos/Capes, Instituto de Mathematica e Estatistica, Universidade de Sao Paulo, Brazil, Short-course Notes, January 9–20, 2012. (see also http://crossworks.holycross.edu)

6. T.E. Cecil and P.J. Ryan, *Geometry of Hypersurfaces*, Springer Monographs in Mathematics, Springer, New York, 2015.

Journal Articles

1. T.E. Cecil, *Geometric applications of critical point theory to submanifolds of complex projective space*, Nagoya Math. J. **55** (1974), 5–31.

2. T.E. Cecil, *A characterization of metric spheres in hyperbolic space by Morse theory*, Tôhoku Math. J. **26** (1974), 341–351.

3. T.E. Cecil, *Geometric applications of critical point theory to submanifolds of complex projective space and hyperbolic space*, Proc. Symp. Pure Math., Amer. Math. Soc. **27** (Part 1) (1975), 115–117.

4. T.E. Cecil, *On the completeness of flat surfaces in S^3*, Colloq. Math. **33** (1975), 139–143.

5. T.E. Cecil, *Taut immersions of non-compact surfaces into a Euclidean 3-space*, J. Differential Geom. **11** (1976), 451–459.

6. T.E. Cecil and P.J. Ryan, *Focal sets of submanifolds*, Pacific J. Math. **78** (1978), 27–39.

7. T.E. Cecil and P.J. Ryan, *Focal sets, taut embeddings and the cyclides of*

Dupin, Math. Ann. **236** (1978), 177–190.

8. T.E. Cecil and P.J. Ryan, *Distance functions and umbilical submanifolds of hyperbolic space*, Nagoya Math. J. **74** (1979), 67–75.

9. T.E. Cecil and P.J. Ryan, *Tight and taut immersions into hyperbolic space*, J. London Math. Soc. **19** (1979), 561–572.

10. T.E. Cecil and P.J. Ryan, *Conformal geometry and the cyclides of Dupin*, Canadian J. Math. **32** (1980), 767–782.

11. T.E. Cecil and P.J. Ryan, *Tight spherical embeddings*, Lecture Notes in Math. **838**, 94–104, Springer, Berlin-New York, 1981.

12. T.E. Cecil and P.J. Ryan, *Focal sets and real hypersurfaces in complex projective space*, Trans. Amer. Math. Soc. **269** (1982), 481–499.

13. T.E. Cecil and P.J. Ryan, *On the number of top-cycles of a tight surface in 3-space*, J. London Math. Soc. **30** (1984), 335–341.

14. T.E. Cecil and P.J. Ryan, *The principal curvatures of the monkey saddle*, Amer. Math. Monthly **93** (1986), 380–382.

15. T.E. Cecil and S.-S. Chern, *Tautness and Lie sphere geometry*, Math. Ann. **278** (1987), 381–399.

16. T.E. Cecil and S.-S. Chern, *Dupin submanifolds in Lie sphere geometry*, Differential Geometry and Topology, Proceedings Tianjin 1986–87, Lecture Notes in Math. **1369**, 1–48, Springer, Berlin-New York, 1989.

17. T.E. Cecil, *Reducible Dupin submanifolds*, Geom. Dedicata **32** (1989), 281–300.

18. T.E. Cecil, *On the Lie curvatures of Dupin hypersurfaces*, Kodai Math. J. **13** (1990), 143–153.

19. T.E. Cecil, *Lie sphere geometry and Dupin submanifolds*, Geometry and Topology of Submanifolds III, 90–107, World Scientific, River Edge, NJ, 1991.

20. T.E. Cecil, *Dupin submanifolds*, Geometry and Topology of Submanifolds V, 77–102, World Scientific, River Edge, NJ, 1993.

21. T.E. Cecil, *Focal points and support functions in affine differential geometry*, Geom. Dedicata **50** (1994), 291–300.

22. T.E. Cecil, M. Magid and L. Vrancken, *An affine characterization of the Veronese surface*, Geom. Dedicata **57** (1995), 55–71.

23. T.E. Cecil and G.R. Jensen, *Dupin hypersurfaces*, Geometry and Topology of Submanifolds VII, 100–105, World Scientific, River Edge, NJ, 1995.

24. T.E. Cecil, *Taut and Dupin submanifolds*, Tight and Taut Submanifolds, MSRI Publications **32**, 135–180, Cambridge Univ. Press, 1997.

25. T.E. Cecil and G.R. Jensen, *Dupin hypersurfaces with three principal curvatures*, Invent. Math. **132** (1998), 121–178.

26. T.E. Cecil and G.R. Jensen, *Dupin hypersurfaces with four principal curvatures*, Geom. Dedicata **79** (2000), 1–49.

27. T.E. Cecil, Q.-S. Chi and G.R. Jensen, *Isoparametric hypersurfaces with four principal curvatures*, Ann. Math. **166** (2007), 1–76.

28. T.E. Cecil, Q.-S. Chi and G.R. Jensen, *Dupin hypersurfaces with four principal curvatures* II, Geom. Dedicata **128** (2007), 55–95.

29. T.E. Cecil, Q.-S. Chi and G.R. Jensen, *Classifications of Dupin hypersurfaces*, Pure and Applied Differential Geometry, PADGE 2007, Editors F. Dillen and I. Van de Woestyne, 48–56, Shaker Verlag, Aachen, 2007.

30. T.E. Cecil, Q.-S. Chi and G.R. Jensen, *On Kuiper's question whether taut submanifolds are algebraic*, Pacific J. Math. **234** (2008), 229–248.

31. T.E. Cecil, *Isoparametric and Dupin hypersurfaces*, SIGMA Symmetry, Integrability and Geom. Methods Appl. **4** (2008), Paper 062, 28 pp.

32. T.E. Cecil and S.-S. Chern, *Dupin Submanifolds in Lie Sphere Geometry (updated version)*, arXiv:2010.06429v1 [math.DG] 13 Oct 2020.

33. T.E. Cecil, *Compact Dupin Hypersurfaces*, Notices ICCM, **9** (2021), Number 1, 57–68, DOI: https://dx.doi.org/10.4310/ICCM.2021.v9.n1.a4

34. T.E. Cecil, *Using Lie Sphere Geometry to Study Dupin Hypersurfaces in* $\mathbf{R}^n$, Axioms, 2024, **13,** 399.
https://doi.org/10.3390/axioms13060399

35. T.E. Cecil, *Classifications of Dupin Hypersurfaces in Lie Sphere Geometry*, Acta Mathematica Scientia, 2024, **44**: 1–36,
https://doi.org/10.1007/s10473-024-0101-7

Translations of Journal Articles

1. Translation of: *Cliffordalgebren und neue isoparametrische Hyperflächen*, Math. Z. **177**, 479–502 (1981) by D. Ferus, H. Karcher and H.-F. Münzner. arXiv:1112.2780v1 [math.DG], 13 Dec 2011.

2. Translation of: *Isoparametrische Hyperflächen in Sphären*, Math. Ann. **251**, 57–71 (1980), by Hans Friedrich Münzner. (2021)
Mathematics Department Faculty Scholarship **14**. College of the Holy Cross.
https://crossworks.holycross.edu/math_fac_scholarship/14

3. Translation of: *Isoparametrische Hyperflächen in Sphären II, Über die Zerlegung der Sphäre in Ballbündel*, Math. Ann. **256**, 215–232 (1981), by Hans Friedrich Münzner. (2021)
Mathematics Department Faculty Scholarship **13**. College of the Holy Cross.
https://crossworks.holycross.edu/math_fac_scholarship/13

4. Translation of: *Dupin'sche Hyperflächen*, Doctoral dissertation, Universität Freiburg (1981), by Ulrich Pinkall. (2022)
Mathematics Department Faculty Scholarship **15**. College of the Holy Cross.
https://crossworks.holycross.edu/math_fac_scholarship/15

5. Translation of: *Familles de surfaces isoparamétriques dans les espaces à courbure constante*, Annali di Mat. **17** (1938), 177–191, by Élie Cartan.

(2023)
Mathematics Department Faculty Scholarship **17**. College of the Holy Cross.
https://crossworks.holycross.edu/math_fac_scholarship/17

6. Translation of: *Sur des familles remarquables d'hypersurfaces isoparamétriques dans les espaces sphériques*, Mathematische Zeitschrift **45**, 335–367 (1939), by Élie Cartan. (2023)
Mathematics Department Faculty Scholarship **18**. College of the Holy Cross.
https://crossworks.holycross.edu/math_fac_scholarship/18

7. Translation of: *Sur quelques familles remarquables d'hypersurfaces*, C.R. Congrès Math Liège, 1939, 30–41, by Élie Cartan. (2023)
Mathematics Department Faculty Scholarship **19**. College of the Holy Cross.
https://crossworks.holycross.edu/math_fac_scholarship/19

8. Translation of: *Sur des familles d'hypersurfaces isoparamétriques des espaces sphériques à 5 et à 9 dimensions*, Revista Univ. Tucuman, Serie A, **1** (1940), 5–22, by Élie Cartan. (2023)
Mathematics Department Faculty Scholarship **20**. College of the Holy Cross.
https://crossworks.holycross.edu/math_fac_scholarship/20

Book Reviews

1. Review of U. Hertrich-Jeromin, *Introduction to Möbius Differential Geometry*, London Mathematical Society Lecture Notes Series, vol. 300, Cambridge University Press, Cambridge, UK, 2003, in *Bulletin of the American Mathematical Society* **42**, pp. 549–554, 2005.

2. Review of G. Waldschap, *Metric Structures in Differential Geometry*, Graduate Texts in Math., vol. 224, Springer, New York, 2004, in *Math. Reviews*, 2006e, Section 53, p. 1, 2006.

3. Review of J. Oprea, *Differential Geometry and Its Applications*, second edition, Classroom Resource Materials Series, Mathematical Association of America, Washington, D.C., 2007, in *Math. Reviews*, 2008k, Section 53, pp. 1–2, 2008.

Selected Conference and Seminar Presentations

1. "Dupin Hypersurfaces," William H. Roever Colloquium, Washington University, St. Louis, April 1, 1993.

2. "Dupin Hypersurfaces," GANG Differential Geometry Seminar, University of Massachusetts, Amherst, April 7, 1997.

3. "Dupin Hypersurfaces," Workshop on Harmonic Maps and Curvature Properties of Submanifolds 2, University of Leeds, England, April 12, 2000 (invited speaker).

4. "Dupin and Isoparametric Hypersurfaces," (2 lectures), Clavius Group Differential Geometry Seminar, Institute for Advanced Study, Princeton, NJ, July 23–24, 2001.

5. "Isoparametric Hypersurfaces in Spheres," Conference in Honor of Thomas F. Banchoff, Brown University, Oct. 28, 2003.

6. "Isoparametric Hypersurfaces in Spheres," Geometry Seminar, Kyushu University, Japan, March 11, 2005.

7. "Dupin Hypersurfaces with Four Principal Curvatures," International Congress on Pure and Applied Differential Geometry, Brussels, Belgium, April 11, 2007.

8. "Lie Sphere Geometry and Dupin Hypersurfaces," Mathematics Colloquium, Idaho State University, May 8, 2008.

9. "Classifications of Dupin Hypersurfaces," Geometry Seminar, Idaho State University, May 9, 2008.

10. "Lie Sphere Geometry and Dupin Hypersurfaces," a series of four one-hour lectures, Clavius Group Geometry Seminar, St. Louis University, July 14–18, 2008.

11. "Geometry from Euclid to Poincaré: Mathematics as a Liberal Art," Richard Rodino Lecture in the Aims of the Liberal Arts, College of the Holy Cross, February 3, 2009.

12. "Isoparametric Hypersurfaces in Spheres," a series of four one-hour lectures, Clavius Group Geometry Seminar, University of Notre Dame, July 6–10, 2009.

13. "Isoparametric Hypersurfaces 1–3," a series of three one-hour lectures, Clavius Group Differential Geometry Seminar, College of the Holy Cross, June 29–July 2, 2010.

14. "Dupin Hypersurfaces in Lie Sphere Geometry," and "Classifications of Dupin Hypersurfaces," two lectures given in the Workshop on Hypersurface Geometry and Integrable Systems, Tohoku University, Sendai, Japan, August 24–27, 2010 (invited speaker).

15. "Compact Proper Dupin Hypersurfaces," Special Session on Differential Geometry and Its Applications, Sectional Meeting of the American Mathematical Society, University of Notre Dame, November 7, 2010 (invited speaker).

16. "Cartan's Identity for Isoparametric Hypersurfaces 1–4," a series of four one-hour lectures, Clavius Group Differential Geometry Seminar, Boston College, July 11–15, 2011.

17. "Lie Sphere Geometry and Dupin Hypersurfaces," a short-course of eight 90-minute lectures, Escola de Altos Estudos/Capes, Instituto de Mathematica e Estatistica, Universidade De Sao Paulo, Brazil, January 9–20, 2012.

18. "Dupin Hypersurfaces with Four Principal Curvatures," a one-hour lecture, Faculty Seminar, Department of Mathematics and Computer Science, College of the Holy Cross, February 20, 2012.

19. "An Introduction to Isoparametric Hypersurfaces in Spheres 1–3," a series of three one-hour lectures, Clavius Group Differential Geometry Seminar, Fairfield University, June 29–July 3, 2012.

20. "A Geometric Version of Reeb's Theorem," a one-hour lecture, Faculty Seminar, Department of Mathematics and Computer Science, College of the Hoy Cross, October 22, 2012.

21. "Isoparametric Hypersurfaces in Spheres 1–3," a series of three one-hour lectures, Clavius Group Differential Geometry Seminar, Loyola Maryland University, June 25–28, 2013.

22. "Isoparametric Hypersurfaces in Spheres 1–6," a series of six one-hour lectures, Clavius Group Differential Geometry Seminar, University of Notre Dame, July 14–24, 2014.

23. "Clifford Algebras and Isoparametric Hypersurfaces in Spheres 1–2," a series of two one-hour lectures, Clavius Group Differential Geometry Seminar, College of the Holy Cross, July 1–2, 2015.

24. "Lie Sphere Geometry and Dupin Hypersurfaces 1–4," a series of four one-hour lectures, Clavius Group Differential Geometry Seminar, College of the Holy Cross, June 21–24, 2016.

25. "Dupin Hypersurfaces 1–6," a series of six one-hour lectures, Clavius Group Differential Geometry Seminar, Georgetown University, June 27–July 6, 2017.

26. "Cyclides of Dupin in Lie Sphere Geometry 1–2," a series of two one-hour lectures, Clavius Group Differential Geometry Seminar, College of the Holy Cross, June 25–26, 2018.

27. "Cyclides of Dupin in 3-space," Clavius Group Differential Geometry Seminar, College of the Holy Cross, July 3, 2019.

Research Grants

1. NSF (RUI - Research at Undergraduate Institutions), Applications of Lie Sphere Geometry to the Study of Taut and Dupin Submanifolds, $38,900, 1987–89.

2. NSF (RUI), Lie Sphere Geometry and Dupin Submanifolds, $48,070, 1989–91.

3. NSF (RUI), Geometry of Submanifolds, $51,164, 1991–93.

4. NECUSE, Computer Graphics in Multivariable Calculus and Differential Geometry, $l2,000, l992–93.

5. NSF (RUI), Differential Geometry of Submanifolds, $35,3l7, l993–95.

6. NSF (RUI), Dupin Submanifolds, $75,000, l995–98.

7. NSF (RUI), Applications of Lie Sphere Geometry to Submanifold Theory, $82,000, 2000–2004.

8. NSF (RUI), Differential Geometry of Submanifolds, $132,000, 2004–2009.

Awards and Honors

1. Arthur J. O'Leary Faculty Recognition Award, College of the Holy Cross, 2004–2006.

2. Mary Louise Marfuggi Faculty Award for Outstanding Scholarship (2007–2008), College of the Holy Cross, April, 2009.

3. Anthony and Renee Marlon Professor in the Sciences, College of the Holy Cross (3-year term, July 1, 2009 – June 30, 2012).

4. Distinguished Professor of Science, College of the Holy Cross, 2012 – present.

Honors Theses Directed at Holy Cross

1. Richard M. Freije, *Groups of Isometries of Spaces of Constant Curvature*, 1981.

2. Michele Intermont, *The Lie Geometry of Spheres*, 1989.

3. Christopher A. Butler, *The Lie Geometry of Spheres*, 1991.

4. Karen L. Purtell, *Finite Reflection Groups*, 1992.

5. Meredith A. Putnam, *Special Surfaces in Three-Space*, 1993.

6. Meghan A. Gillin, *Some Results in the Global Differential Geometry of Curves and Surfaces*, 1994.

7. Patricia Cordeiro, *Isometry Groups of the Plane, the Sphere and Hyperbolic Space*, 1996.

8. Katherine M. Crow, *Finite reflection Groups in Two and Three Dimensions*, 1996.

9. Rebecca Y. Martel, *Classifying Finite Reflection Groups*, 1997.

10. Aaron Qureshi, *Lie Sphere Geometry: An Introduction*, 1998.

11. Thomas J. Emmerling, *Finite Reflection Groups in Two and Three Dimensions*, 2002.

12. Alison C. McCarthy, *A Comparison of Three Geometries: Euclidean, Spherical and Hyperbolic*, 2002.

13. John T. Giblin, Jr., *Spacetime Embedding Diagrams for General Relativity and An Analysis of Their Educational Potential*, 2003 (co-directed with Prof. Robert Garvey, Department of Physics).

14. Catherine A. Ballway, *Matrix Groups*, 2004.

15. Ellen K. Gasparovic (Fenwick Scholar), *Strange New Universe: A Study of Euclidean and Non-Euclidean Geometries*, 2006.

16. Renee A. Laverdiere, *Matrix Groups: A Confluence of Algebra and Geometry*, 2007.

17. Marisa Zemsky, *Isometry Groups of Geometric Spaces*, 2011.

18. Caroline Galvinhill, *Exploring Euclidean and Non-Euclidean Geometry*, 2018.