CURRICULUM VITAE

J. SCOTT PROVAN

Professor
Department of Operations Research
University of North Carolina at Chapel Hill
Chapel Hill, NC 27599-3180

EDUCATION

B.S., Carnegie-Mellon University, Mathematics, 1971

M.A., Michigan State University, Mathematics, 1973

M.S., Ph.D. Cornell University, Operations Research, 1975, 1977

EMPLOYMENT

1995–2000	Chair, Department of Operations Research, University of North Carolina at Chapel Hill
1994–1997	Paul Ziff Term Professor, Department of Operations Research, University of North Carolina at Chapel Hill
1990–	Professor, Department of Operations Research, University of North Carolina at Chapel Hill
1988–1989	Visiting Associate Professor, joint with the Departments of Combinatorics & Optimization and Management Science, University of Waterloo, Waterloo, Ontario (on W.N. Reynolds sabbatical leave from the University of North Carolina at Chapel Hill)
1985–1990	Associate Professor, Department of Operations Research, University of North Carolina at Chapel Hill
1982–1985	Assistant Professor, Department of Operations Research, University of North Carolina at Chapel Hill
1980–1982	NRC Postdoctoral Associate, National Bureau of Standards, Gaithersburg, Maryland (on leave from SUNY at Stony Brook)

Summer 1979 Visiting Mathematician, Brookhaven National Laboratory, Upton, New York

1977–1982 Assistant Professor, Department of Applied Mathematics and Statistics, SUNY at Stony Brook, Stony Brook, New York

PUBLICATIONS:

A decomposition principle for simplicial complexes and its relation to diameters and shellings (1979), with L.J. Billera. **Annals of the New York Academy of Sciences** 319, 82–85.

Decompositions of simplicial complexes related to diameters of convex polyhedra (1980), with L.J. Billera. **Mathematics of Operations Research** 5, 576–594.

Leontief substitution systems and matroid complexes (1980), with L.J. Billera. **Mathematics of Operations Research** 7, 81–87.

Bounds on the reliability polynomial for shellable independence systems (1980), with M.O. Ball. **SIAM Journal on Algebraic and Discrete Methods** 3, 166–181.

Determinacy in linear systems and networks (1981). **SIAM Journal on Algebraic and Discrete Methods** 3, 262–278.

Fault-specific circuit testing as an integer program (1982). **Proceedings, 1982 IEEE International Large Scale Systems Symposium**, Virginia Beach, Virginia, 224–228.

The complexity of counting cuts and of computing the probability that a graph is connected (1983), with M.O. Ball. **SIAM Journal on Computing** 12, 777–788.

Calculating bounds on reachability and connectedness in stochastic networks (1983), with M.O. Ball. **Networks** 13, 253–278.

Computing network reliability in time polynomial in the number of cuts (1984), with M.O. Ball. **Operations Research** 32, 516–526.

Properties of systems which lead to efficient computation reliability (1984), with M.O. Ball. **Proceedings of the 1984 Global Telecommunications Conference**, 866–870.

An efficient implementation of conditional Monte Carlo estimation of path lengths in stochastic networks (1985) with V. Kulkarni. **Operations Research** 33, 1389–1393.

Polyhedral combinatorics and network reliability (1986). **Mathematics of Operations Research** 11, 36–61.

The complexity of reliability computations in planar and acyclic graphs (1986). **SIAM Journal on Computing** 15, 694–702.

Approximating reliability in networks (1986). **IEEE Transactions on Reliability**, *R*35, 260–268.

Efficient recognition of matroid and 2-monotonic systems (1986), with M.O. Ball. **Applications of Discrete Mathematics,** R.D. Ringeisen and F.S. Roberts, eds., SIAM Publications, 122–134.

Computing K terminal reliability in time polynomial in the number of (s, K)*-quasicuts* (1986), with M.O. Ball. **Proceedings of the 4th Army Conference on Applied Mathematics and Computing**, 901–907.

Substitutes and complements in constrained linear systems (1987). **SIAM Journal on Algebraic and Discrete Methods** 8, 585–603.

Convexity and the Steiner tree problem (1988). **Networks** 18, 55–72.

Disjoint products and efficient computation of reliability (1988), with M.O. Ball. **Operations Research** 36, 703–715.

Exact cuts in networks (1989), with V. Kulkarni. **Networks** 19, 281–289.

An approximation scheme for finding Steiner trees with obstacles (1989). **SIAM Journal on Computing** 17, 920–934.

Shortest enclosing walks and cycles in embedded graphs (1989). **Information Processing Letters** 30, 119–125.

Reliability covering problems (1991), with M.O. Ball and D.R. Shier. **Networks**, 21, 345–351.

Boolean decomposition schemes and the complexity of reliability computations (1991). DIMACS Series in **Discrete Mathematics** 5, 213–228.

The role of Steiner hulls in the solution to Steiner tree problems (1992). **Annals of Operations Research**, 33, 537–548.

Two new criteria for finding Steiner hulls in Steiner tree problems (1992). **Algorithmica**, 7, 289–302.

Delta-wye transformations and the efficient reduction of two-terminal planar graphs (1993), with T.A. Feo. **Operations Research**, 41, 572–582.

Efficient enumeration of the vertices of polyhedra associated with network LP's (1994). **Mathematical Programming** 63, 47–64.

Threshold reliability of networks with small failure sets (1995), with M.O. Ball and J.N. Hagstrom. **Networks** 25, 101–115.

The complexity of computing the Tutte polynomial on transversal matroids (1995), with C.J. Colbourn and D. Vertigan. **Combinatorica** 15, 1–10.

A new approach to solving three combinatorial enumeration problems on planar graphs (1995), with C.J. Colbourn and D. Vertigan. **Discrete Applied Mathematics** 60, 119–129.

Network Reliability (1995), with C.J. Colbourn and M.O. Ball. Chapter 11 in **Handbooks in OR & MS** 7, Elsevier Science B.V., 673–762.

A paradigm for listing (s,t)-cuts in graphs (1996), with D.R. Shier. **Algorithmica** 15, 351–372.

The delta-wye approximation procedure for two-terminal reliability (1996), with T.A. Feo and M.K. Chari. *Operations Research* 44, 745–757.

Calculating K-connectedness reliability using Steiner bounds (1996), with M.K. Chari. **Mathematics of Operations Research** 21, 905–921.

On finding two-connected subgraphs in planar graphs (1997). **Operations Research Letters**, 20, 81–84.

Counting problems associated with Steiner trees in graphs (1997), with M.K. Chari. **SIAM Journal on Discrete Mathematics** 10, 436–446.

Two-path subsets: efficient counting and applications to performability analysis (1998), with M.O. Ball and J.N. Hagstrom. **Discrete Applied Mathematics** 85, (1998), 25-45.

Minimal connected enclosures on an embedded planar graph (1998), with C. Alexopolous, H.D. Ratliff, and B.R. Stutzman. **Discrete Applied Mathematics** 91 (1999), 25–38.

A fully polynomial approximation scheme for the Euclidean Steiner augmentation problem (2000), in **Advances in Steiner Trees** D.-Z. Du, J.M. Smith, and J.H. Rubinstein (Eds.), Kluwer Academic Publishers, 235–253.

On the structure and complexity of the 2-connected Steiner network problem in the plane (2000), with E.L. Luebke, **Operations Research Letters** 26, 111–116.

Four-terminal reducibility and projective-planar wye-delta-wye reducible graphs (2000), with D. Archdeacon, C. Colbourn, and I. Gitler. **Journal of Graph Theory** 33, 83–93.

A polynomial-time algorithm to find shortest paths with recurse (2003). **Networks** 41, 115–125.

Enumeration in convex geometries and associated polytopal subdivisions of spheres with Louis J. Billera and Samuel K. Hsiao. To appear in **Discrete and Computational Geometry**.

RESEARCH INTERESTS

Computational methods in networks and network reliability, discrete optimization and polyhedral combinatorics. Current problem areas: (1) designing networks with specified performance capabilities such as sufficient throughput volume, small communications delay, specified connectivity, or enclosure/separation properties, (2) designing computer software for presenting, experimenting with, and solving complex decision

problems. Developing **IDEAS**, the *Instructional Database for Educational and Academic Software*, a teaching software platform.

PROFESSIONAL ACTIVITIES

Operations Research Society of America: member, attend 1–2 meetings per year, session chair, cluster organizer.

Society for Applied and Industrial Mathematics: member, regularly attend the Symposia for Discrete and Applied Mathematics.

Advanced Research Institute in Discrete and Applied Mathematics held at Rutgers University, 1986–1992: invited participant, speaker and session chair.

Associate Editor, **Networks**

RESEARCH GRANTS

1984–1989 Air Force Office of Scientific Research Grant AFOSR 840140 "Research in Reliability, Availability and Maintainability for Complex Systems."

1992–1995 National Science Foundation Grant 37036, "Polynomial Time Algorithms for Network Problems on Planar Graphs."

1996–97 University of North Carolina Chancellor's Award for Instructional Technology grant, "A Curriculum in Modeling and Solving Problems Using Computers"

RECENT INVITED TALKS:

Finding 2-Connected Subgraphs in Planar Graphs, November 1995, colloquium series, Department of Mathematics, Louisiana State University, Baton Rouge.

Two-Path Subsets: Efficient Counting and Applications to Performability Analysis, May 1996 for the INFORMS National Meeting, Washington DC, and June 1996 for the SIAM Symposium on Discrete Mathematics, Baltimore.

2-connected augmentation problems in planar graphs, May 1996 for Optimization Days, Montréal.

Labors Even Hercules Couldn't Have Done: A Guide to Computers and Intractibility, November 1996, Operations Research Colloquium Series, North Carolina State University.

Finding 2-Connected Subgraphs in Planar Graphs, November 1996, plenary talk, Combinatorial and Computational Aspects of Optimization, Topology, and Algebra, Taxco, Mexico.

Minimal Connected Enclosures on an Embedded Planar Graph, May 1997 for the INFORMS National Meeting, San Diego.

Strengthening to Survivability in the Plane, August 1997 for the 16^{th} International Symposium on Mathematical programming, Lausanne, Switzerland.

A MATLAB-Based Package for Teaching OR Concepts, October 1998 for the INFORMS National Meeting, Seattle.

Higher Connectivity Problems in the Euclidean Plane, October 1998 for the INFORMS National Meeting, Seattle.

Designing for Invulnerability in Networks: The Euclidean Case, plenary talk, Fourteenth Clemson Mini-Conference on Discrete Mathematics, Clemson University, September, 1999

On the Structure and Complexity of the 2-Connected Steiner Network Problem in the Plane, November 1999 for the INFORMS National Meeting, Philadelphia.

ADVISEES 1987–1995

	MS	PhD
Chair	Melissa Lucas	Manoj Chari
	Rochelle Buchman	Marcia Nance
	Anita Blanchard	Roger Burk
	Aniket Majundar	Farah Marasigan
	Karen Susenna	Emily Larson
	Lynne Yellin	Marcy Reid
	Genie Boericke	
	Sherry Cohen	
	Praveen Kumar	
	Terri White	
	Megan McEver	
	Leah Hart	
	Rajeev Mahrotri	
	Bin Xie	
	Amy Buege	
Committee	Elizabeth Keyes	Christos Alexopoulas
	Robert Camp	Marcello Bartroli
	Jamie Moore	Tien Ye Shaw
	Subhash Desai	Keith Ware
	Andrea Duvall	Norman Curet
	Sanjay Jagtap	Gehan Corea
	Shawn Krest	Anupama Narayanan
	Kristy Orringer	Rema Hariharan
	Ed Overton (Math.)	Daniel Levi (Math)
	Kevin Keyes	Jennifer McNulty (Math)
	David Johannsen(Math.)	Ben-hao Hwang
	Joe Sherman	Barbara Hoopes
	Akira Negi	S. Janakirim
	Christopher Hawke	William Sribney (Biostat.)
	Reid Gilliam	S. Shalf (Math.)
	Stoyko Nikolov	Christina Arguelles
	Cyrus Bradford	Ozgur Ozluk
	Benton McCune	M. Kart (Math.)

DEPARTMENTAL COMMITTEES

Chair 1995–2000

Colloquium Chair 1982–83, 1988–89, 1992–94

Graduate Director 1986–88, 1990–91

Admissions Committee 1986–88, 1990–93

Library Chair 1991–92, 1993–94

Computer Coordinator 1993–95

COURSES INITIATED

ORSA 216, Discrete Optimization: Algorithms and Complexity. Third year graduate course which studies work on the leading edge of research in the design and analysis of solution algorithms for discrete optimization problems. (Taught 3 times)

ORSA 350, Operations Research Projects Course: Enables students to undertake specific projects for University and local clients involving the analysis of problems of primarily an *organizational/operational* nature. Topics include waste recycling, snow removal, police recordkeeping, and inventory for computer laboratories. (Taught 3 times)

OTHER COURSES TAUGHT

OR 40 Introduction to Decision Sciences (1992,1994).

OR 180 (currently ORSA 183): Stochastic Models in Operations Research (1983)

OR 181: Deterministic Models in Operations Research (Taught 6 times)

OR 210: Deterministic Methods in Operations Research (Taught 6 times)

OR 215: Network Flows (Taught 8 times)