

SALAH E. ELMAGHRABY, PhD

University Professor Emeritus
Department of Industrial & Systems Engineering
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Education

B.Sc.	Mechanical Engineering	Cairo University	1948
M.Sc.	Industrial Engineering	Ohio State University	1955
Ph.D.	Industrial Engineering	Cornell University	1958

Personal Data

Born: 21 October, 1927
Married: to Amina Ishac
Has three daughters: Wedad Jasmine, Karima Noor, and Leila.
Home address: 3604 Ranlo Drive, Raleigh, NC 27612, USA.

Employment

July 2010 to Present	University Professor Emeritus, NCSU
July 1967 to June 2010	University Professor, N.C. State University, Raleigh, N.C.
January 1970 to June 1990	Director, Graduate Program in Operations Research
July 1971 to June 1975	Associate Head and Graduate Administrator, Industrial Engineering Dept., N.C. State University.
July 1962 to July 1967	Associate Professor, Dept. of Adm. Sci., Yale University, New Haven, Connecticut.
Spring Semester, 1967	Visiting Associate Professor, School of Industrial Engineering, Cornell University, Ithaca, N.Y.
June 1958 to July 1962	Research Leader, Western Electric Company, Engineering Research Center, Princeton, New Jersey.
Sept. 1955 to June 1958	Research Assistant, Cornell University, Ithaca, N.Y.

October 1949 to June 1954	Inspecting Engineer, Foreign Inspection Office of the Egyptian State Railways in London, Brussels and Budapest.
Jan. 1949 to October 1949	Teaching Assistant, School of Engineering, Cairo, Egypt.
Aug. 1948 to Jan. 1949	Plant Manager, The Coca Cola Bottling Co., Cairo, Egypt

Foreign Experience of Professional Nature

- 5 years in Europe—firsthand experience with the majority of Western European industry: England, France, Belgium, Holland, Denmark, Norway, Luxembourg, Federal German Republic, Austria, Italy, and the Hungarian heavy industries.
- Visiting Professor, European Institute for Advanced Studies in Management, in Brussels, and the Catholic University of Leuven, in Leuven, Belgium, Academic year 1974–1975.
- Visiting Lecturer, Department of Production Engineering, Alexandria University, Egypt, December, 1976.
- Principal Scientist, Kuwait Institute for Scientific Research, Kuwait, Academic years 1981–1983, on leave from NCSU.
- Visiting Professor, The Thomson Chair Professor of Production Management, Claude Bernard University of Lyon I, Lyon, France, May–June 1991 and May–June 1992, June–July 1995.
- Visiting Professor, Department of Systems Engineering, Nagoya Institute of Technology, Nagoya, Japan, December 1997 to March 1998.
- Visiting Professor, CREGI, Faculte Universitaire Catholique de Mons (FUCAM), Summers of 2000, 2001, 2002, 2003.
- Visiting Professor, University of Paris, SUPMECA, May 2004 and June 2006.
- Chair Professor, Tsinghua University, Beijing, PRC, Spring semester 2005 (January through June).
- Visiting Professor, University de Minho, Guimaraes campus, Portugal, summer 2006 and 2008.
- Visiting Professor, Université d’Artois at Bethune, France, June 2008.
- Visiting Professor, **National Chiao Tung University (NCTU)**, Taiwan, Oct.-Nov., 2008.

Guest Lecturer

- **Belgium:** The Center of Operations Research and Econometrics; Université Catholique de Louvain; Katholieke Universiteit Leuven; Faculté Universitaire de Mons.

- **Canada:** The Univ. of Toronto, Toronto; the University of Montreal and the Polytechnique University, Montreal; Laval University, Quebec City.
- **China:** Guest lecturer at the Academy of Science, the Department of Mathematical Sciences at Tsinghua University, The National Academy of Mathematical Sciences in Beijing; Zhejiang University in Hangzhou, both in PRC.
- **Egypt:** The American University of Cairo.
- **France:** The University of Lille; The University of Grenoble, University of Lyon 1 (Claude Bernard), Lyon, the ISMCM of the University of Paris, and the Université de Valenciennes et du Hainaut Cambrésis, Valenciennes.
- **Germany:** The University of Bonn; The Free University of Berlin; The Technical University of Aachen; the University of Karlsruhe, Karlsruhe
- **Holland:** The Mathematische Centrum, Amsterdam
- **Japan:** Nagoya Institute of Technology, Nagoya; Osaka Institute Of Technology, Osaka; Aoyama Gakuin University, Tokyo; Ashikaga Institute Of Technology, Ashikaga, Kyoto Institute of Technology, Kyoto
- **Portugal:** The Technical University of Lisbon, Lisbon; the University of Minho, Guimaraes
- **Saudi Arabia:** The University of Petroleum and Minerals, Dhahran
- **South Africa:** The University of Johannesburg
- **Sweden:** The Tech. University of Linköping
- **Turkey:** Bilkent University, Ankara
- **UAE:** The University of the United Arab Emirates, Dubai
- **UK:** The Lucas Center for Engineering Production, Birmingham; Brunel University, London
- **US:** Over 30 universities in the US, the latest of which is the Louisiana State Univ. Chancellor’s Distinguished Lecture Series, March 1999.

Membership in Learned and Professional Societies

IIE	The Institute of Industrial Engineers
NSPE	National Society of Professional Engineers
INFORMS	Operations Research Society of America & The Institute of Management Science
POMS	Production and Operations Management Society

Membership in Honorary Societies

Alpha Pi Mu	(Industrial Engineering)
Phi Kappa Phi	(Science)
Sigma Xi	(Scientific Research)
Tau Beta Pi	(Engineering)
Sigma Iota Rho	(International)

Special Honors and Awards

- Student Competition of ILS10 has been named after him; Casablanca, Morocco April 14–17, 2010.
- Elected Fellow, INFORMS, October 2004
- Recipient of the Frank and Lillian Gilbreth Award, IIE, 2003
- Recipient of the Alexander Quarles Holladay Medal for Excellence, NCSU, 2000
- Recipient of Honorary Doctorate, University Claude Bernard Lyon I, Lyon, France, October 1998.
- Invited as Visiting Professor, Faculté Universitaire Catholique de Mons, Belgium, the summers of (1999 through 2003).
- Invited as The Thomson Chair Professor of Production Management, Claude Bernard University of Lyon I, Lyon, France, the summers of 1991, 1992, 1995.
- Recipient of The Kuwait Foundation for the Advancement of Science Distinguished Award, May 1990.
- Recipient of The R. J. Reynolds Distinguished Award in Research and Education, College of Engineering, NCSU, 1987.
- Elected Fellow of the Institute of Industrial Engineers, 1986.
- Operations Research Division Award, IIE, 1980.
- Awarded the David F. Baker Distinguished Research Award, IIE, 1970.
- Recipient of the First Prize, National Center for Education & Research in Equip. Policy, 1958.
- Recipient of the First Prize, Morse Chain Co. Competition Award, Ithaca, NY, 1957.

Research Grants and Awards (Principal Investigator)

- The Academy of Applied Science (Summer 1980), US\$ 2,500
- Alcatel Network Systems (August 1991–July 1993), US\$ 230,000 (co-PI)
- The Army Research Office (1972–1978), approximately US\$ 130,000
- The Army Research Office (1979–1985) approximately US\$ 97,000
- The Army Research Office (1986–1989), US\$ 280,000
- Bell Northern Research (1990–1992), US\$ 127,000 (co-PI)
- National Aeronautics and Space Administration (1969–1970), US\$ 15,000
- Department of Correction (1975–1977), US\$ 73,000
- National Science Foundation (1964–1974), approximately US\$ 250,000
- National Science Foundation (1978–1981), approximately US\$ 102,000
- Northern Telecom (January 1991–December 1991), US\$ 18,000
- The Office of Naval Research (1971–1974), approximately US\$ 75,000
- Tultex Inc., Martinsville, VA, (Jan. 1992–Dec. 1992), US\$ 23,000 (co-PI)
- IBM Corp, RTP, NC (Aug. 1994–May 1995), US\$ 43,000
- Glen Raven Mills, Burnsville, NC (Jan. 1991–Dec. 1996), US\$ 95,000

- Northern Telecom, Research Triangle Park, NC. (Jan. 1997–Aug. 1997), US\$ 40,000
- Glen Raven Mills, Burnsville, NC (Sept. 1992–Dec. 1997), US\$ 120,000
- North Carolina Sea Grant (Jan.2001–June 2001), US\$ 8,518
- ABB, Centennial Campus (May 22, 2001–July 31, 2001), \$7,770, and August 2002 through July 3, US\$ 41,310.
- SAS, Cary N. C., Fall 2005, US\$ 34,000.
- Hamlin Sheet Metal Co., Benson, NC, 2007–2010, US\$ 55,000.

Professional Activities

- Keynote Speaker, INFORMS 2011, Charlotte, NC.
- Keynote Speaker, ILS2010, Casablanca, Morocco, April 14–17, 2010.
- Co-Chairman of Students Research Competition, IESM07 Conference, Beijing, PRC, May 29-June 1, 2007. Also Member of the Conference Scientific Committee.
- Founder and Editor-in-Chief, *Jour. Oper. and Logistics (JOL)*, I4E2 Society, 2005 to present.
- Co-Chairman of Students Research Competition, Information Systems, Logistics and Supply Chain (ILS) Conference, Lyon, France, May 15–18, 2005.
- Regional Editor (*The Americas*), *Intern'l Jour. Production Economics (IJPE)*, Elsevier, Aug. 1995–2000.
- Co-Founder and Council Member, PMS Intern'l Workshops, 1988–1998. Keynote speaker, PMS98, Istanbul, Turkey, July 7, 1998.
- Vice President for education, PMI Research Triangle Chapter, 1991
- Program co-Chairman, POM-91, November 1991
- Member, Board of Advisors, POMS, 1990-present
- Program Chairman, Manufacturing International '90, Atlanta, Georgia, March 1990
- Member, Advisory Committee of Computer and Mathematics in Engineering Design, National Science Foundation, Washington, D.C., 1964–1966
- Member, Information Systems Committee, ASEE, 1970–1973
- Director of Research in Production and Inventory Control, Institute of Industrial Engineers, 1961–1962.
- Research Chairman for the Operations Research Division, AIIE, 1967
- Member, AIIE Membership Board of Review, 1976–1979
- ORSA Lectureship Series, 1972–1973, 1974–1976, 1978–1979
- Associate Editor, *Management Science, Theory & Applications*, 1968–1976
- Abstractor for *International Abstracts in OR*, the official publication of IFORS, 1970–1973
- Program Chairman, ORSA National Meeting, Miami, Florida, November 10–12, 1969

- Member, Advisory Board, Encyclopedia of Computer Science and Technology, M. Dekker Publishers, 1973–1978.
- Associate Editor, The Transactions of Industrial Engineering, 1969–1972
- Senior Editor, IE Transactions, 1972–1974
- Department Editor, Production Planning/Scheduling/Control, IIE Transactions, 1976–1980 and again 1985–1988. Department Editor, Feature Applications, IE Transactions, 1989–1992.
- Associate Editor, Opsearch (Indian Journal on Operations Research), 1982-present Systems Area Program Chairman, ORSA National Meeting, Atlantic City, N.J., November, 1972
- Member, Publications Committee, ORSA, 1974–1978
- Regional Counselor, Omega Rho, 1975–1976 (Honor Society for Operations Research)
- Referee for: Army Research Office, National Science Foundation, The Research Council of Canada, The Research Council of Belgium, ASME, Euro. J. Oper. Res., IE Trans., J. Engr. & Appl. Sci., Management Sci., Nav. Res. Logistics, Omega, Oper. Res., POMS, Intern'l J. Prod. Res., Annals of Operations Research.
- Member, Board of Advisors, POMS, 1990-present
- Program Chairman, Manufacturing International '90, Atlanta, Georgia, March 1990
- Member, Advisory Committee of Computer and Mathematics in Engineering Design, National Science Foundation, Washington, D.C., 1964–1966
- Member, Information Systems Committee, ASEE, 1970–1973
- Director of Research in Production and Inventory Control, Institute of Industrial Engineers, 1961–1962.
- Research Chairman for the Operations Research Division, AIIE, 1967
- Member, AIIE Membership Board of Review, 1976–1979
- ORSA Lectureship Series, 1972–1973, 1974–1976, 1978–1979
- Abstractor for International Abstracts in OR, the official publication of IFORS, 1970–1973
- Program Chairman, ORSA National Meeting, Miami, Florida, November 10–12, 1969
- Member, Advisory Board, Encyclopedia of Computer Science and Technology, M. Dekker Publishers, 1973–1978.
- Associate Editor, The Transactions of Industrial Engineering, 1969–1972
- Senior Editor, IE Transactions, 1972–1974

University/College Service

- Senator, N.C. State University Faculty Senate, 1972–1974, 1999–2002.
- Chairman, Graduate Studies Committee, School of Engineering, 1985–1986.
- Member, Administrative Board of the Graduate School, 1988–1994.
- Member, Advisory Council of the Graduate School, 1991–1994.

- Member, Council of University Professors.
- President, NCSU Chapter of Sigma Xi, 1998.
- Chairman of over twenty ad-hoc committees in the Oper. Res. Graduate Program, the Ind. Eng. Department, the College of Engineering, and the University at large, and member of over thirty other ad hoc committees in the University, college, department of Ind. Eng. and Graduate Program of Operations Research.

Consulting Experience

ABB, Centennial Campus (Raleigh NC)
 Cyanamid Co. (Wallingford, Conn.)
 Ford Foundation (Cairo, Egypt)
 Glen Raven Mills (Burnsville, N.C.)
 IBM Co. (Research Triangle Park, N.C.)
 Logistics Management Institute, (McLean, VA)
 Messier-Dowty (Bidos, France)
 Nello-Teer Co. (Durham, N.C.)
 Olivetti Co. (Ivrea, Italy)
 The Kharafi Construction Co. (Abu Dhabi and Kuwait)
 The Kuwait Institute for Scientific Research (Kuwait)
 The Kuwait Foundation for the Advancement of Science (Kuwait)
 The Kuwait University, College of Engineering
 Texasgulf Co. (Raleigh, N.C.)
 The TOKTEN program of the UNDP, Egypt
 Tultex, Inc., Martinsville, VA
 The Western Electric, Co., Research Center (Princeton, N.J.)

Biographical Listings

Who's Who in the South and Southwest
 Who's Who in America
 Men and Women of Distinction
 International Who's Who of Intellectuals
 Men of Achievement
 American Men and Women of Science
 Who's Who in Engineering
 Global Register's Who's Who

PhD Dissertations and Master's Theses Supervised

Doctor of Philosophy Degree

Name	Title	Year Graduated
Ramachandra, Girish	Optimal resource allocation in Activity Networks	Dec., 2006
Matta, Marie E.	An empirical and theoretical study of outpatient	May, 2004
Karnoub, Razek E.	Scheduling problems employing simulation and genetic algorithm methodologies (co-chair, Duke University, Durham NC)	May, 2002
Stephanie R. Earnshaw	An exact bidirectional approach to the resource constrained project scheduling problem The location/allocation of field representatives and trainers to sites (co-chair)	May, 2000
Soewandi, Hanijanto	Sequencing jobs on two- and three-stage hybrid flowshop to minimize makespan	May, 1998
Zhang-Lo, Shuzhi	ATM topological design and network modification	December, 1996
Michael, David J.	The optimal representation of activity networks as directed acyclic graphs	May 1991
Ferrell, William G.	Systems dynamics in quality assurance	May 1989
Pulat, P. Simin	Maximum flow problem for generalized networks	May 1984
Dodin, Bajis M.	On the completion time of stochastic PERT networks	May 1982
Salem, Adel M.	Optimal time reduction in activity networks under convex cost functions	May 1980
Sarin, Subhash C.	Project planning under constrained resources	May 1978
Elimam, Abdelghani A.	Makespan minimization on identical parallel machines	August 1978
McGinnis, Leon F.	Approximate and exact solution procedures for a class of facilities location problems (co-chair)	May 1975
Rihani, Fouad Akil	A model for selecting the optimum number, size and location of highway maintenance yards (co-chair)	May 1974
Modi, Jamshed A.	The use of solution generating systems for knapsack problems with extensions to general integer linear programming	August 1973
Mallik, Arup K.	The scheduling of a single processor under deterministic demand for several products	May 1972
Arisawa, Sanji	Solution of the hub-wheel scheduling problem in transportation networks	May 1972
Wig, Monmahan	On the stock cutting problem	May 1969

Master of Science Degree

Name	Title	Year Graduated
Rajneesh Rajneesh	Scheduling precedence-constrained jobs on two resources to minimize the total weighted completion time	August 2012
Adam J. Rudolph	An algorithm for determining the optimal resource allocation in stochastic activity networks	May, 2008
Clayton D. Morgan	Meta-heuristics for resource allocation in activity networks	Dec., 2006
Ramachandra, Girish	Scheduling precedence related jobs on identical parallel processors	May, 2002
Lightner, Constance	Analysis of linear programming models applied to an emergency vehicle location problem	August, 1997
Taner, Mehmet R.	A study of the mean and variance of project duration in a probabilistic activity network (co-chair)	May, 1998
Thoney, Kristin A.	The two-machine stochastic flowshop sequencing problem	August 1997
Baxter, Elizabeth J.	Simulation of a software engineering process	May 1993
Reed, Stephanie J.	The sequencing of picking stations in a garment warehouse	May 1993
Schellenberger, Keith W.	Sequencing of parallel processors	May 1993
Hurchalla, David A.	An optimal algorithm for solving the pick-up and delivery problem with time constraints	May 1991
Singh, Major	The modeling of large scale software development	May 1991
Johnson, Jerry W.	Economic manufacturing quantity with inspection for processes under the influence of learning	May 1986
Dillery, D. Scott	On the optimal partitioning of a seasonal distribution	May 1985
Venable, Charles J.	Capacity loading and scheduling in a testing facility	May 1985
Colby, Anthony H.	On the complete reduction of acyclic networks	May 1984
Nishimura, Morio	Scheduling flow shops of the ordered and semi-ordered types	May 1980
Samara, Hanan	The dynamic economic lot size model with fixed batch size and sequence dependent change over costs	May 1979
Dillehunt, Susan L.	The optimization of a machine planting system	May 1978
Allen, Jerry W., Jr.	Sequencing on a single processor with a common deadline	May 1978
Pulat, P. Simin	Optimal project compression with multiple node due dates	May 1977
Bazzi, Muna	A simulation study of the faculty population in a university	May 1977
Dodin, Bajis M.	A branch-and-bound algorithm for scheduling n products on a single processor under deterministic demand	May 1975
Worley, Jerry S.	The application of legendre polynomials and spline functions to dynamic programming	May 1974
Dix, Lynn P.	Scheduling lot size production with constant demand	May 1973
Park, Sung H.	A branch-and-bound method for the problem and group theoretic aspects of an integer programming formulation	May 1971

Supervised 9 Master of Operations Research and Master of Industrial Engineering (non-thesis). Currently supervising 3 Master and 1 doctoral candidate in the USA, and co-advisor of 2 doctoral candidates in Portugal, 1 doctoral candidate in France.

Member of 40+ other Master and doctoral Advisory Committees.

“Member of the Jury” of 6 doctoral students in Europe and Canada. They are, arranged chronologically:

Jamal Ouenniche, Laval University, Canada, 1998 (External Examiner)

Fouad Riane, Faculte Catholique de Mons, Belgium, 1998 (Rapporteur)

Omar Moursli, Universite Catholique de Louvain, Belgium, 1999 (Rapporteur)

Trond Jorgensen, Norges-Technisk Naturvitenskapelige Universitet, Trondheim, Norway, 1999 (External Examiner)

Anabela Tereso, Universidade do Minho, Braga, Portugal, 2002 (co-Chair)

Hamid Allaoui, Faculte Catholique de Mons, Belgium, 2004 (co-Chair)

Emilie Grandgirard, University Claude Bernard Lyon 1, Lyon, France, November 2007 (External Examiner)

“External Reader” for 4 doctoral theses. They are:

N. R. Achutan, Indian Statistical Inst., Calcutta, India, 1980

V. R. Prasad, Indian Statistical Inst., New Delhi, India, 1982

Kanda, Indian Inst. of Tech., Delhi, India, 1985

V., Suresh, Indian Inst. of Tech., Madras, India, 1994.

Scientific Publications—Books

- **Production Capacity: Its Bases, Functions, and Measurement**, Chapter I-4 in Handbook of Production Planning, K. Kempf, P. Keskinocak, and R. Uzsoy, eds, (2011).
- **A Multi-Model Approach for Production Planning and scheduling in an Industrial Discrete-Continuous Environment**, Chapter II-19 in Handbook of Production Planning, K. Kempf, P. Keskinocak, and R. Uzsoy eds, (2011), co-authored with A. Artiba, D. Duvivier and V. Dhaevers.
- **Operations Research**, chapter in Encyclopedia of Physical Science and Technology, 3rd ed., R. A. Meyers, ed., (2001). Co-authored with S-C. Fang.
- **Activity Nets: PERT/CPM and Their Extensions**, Section 15.5 in Handbook of Discrete and Combinatorial Mathematics, K. H. Rosen, ed., (1998).
- **The Planning and Scheduling of Production Systems: Methodologies and Applications**; Chapman & Hall, (1997), co-editor with A. Artiba, 367 pages. This is a book of original readings on the subject.
- **Handbook of Operations Research**, co-editor with J. J. Moder, Reinhold Van-Nostrand Publishers, Vol. 1, January, (1978); Vol. 2, April (1978). This handbook was translated into Russian.

- **Advances in Project Scheduling**, (1989), Chapter I, Part III, R. Slowinski, J. Weglarz (Eds.). “The estimation of some network parameters in the PERT model of activity networks: Review and critique.” Elsevier, Amsterdam, pp. 371–432.
- **Operations Research**, Chapter in the Encyclopedia of Physical Science and Technology (1992); co-authored with S-C Fang.
- **Activity Networks: Project Planning and Control by Network Methods**, John Wiley & Sons, 443 pages, (1977). This book was translated into Japanese.
- **Allocation Models**, contributed to the Encyclopedia of Computer Science, (1974), 371–382; co-authored with M. El-Kammash.
- **Scheduling Theory and Its Applications**, Editor, Proceedings of Symposium, Springer-Verlag, (1973).
- **Operations Research**, Chapter 3 of Section 10 in Industrial Engineering Handbook, McGraw-Hill, 3rd Ed., (1971), H. B. Maynard, Ed.
- **Some Network Models in Management Science**, Springer-Verlag Lecture Series in Operations Research, No. 29, June, (1970).
- **The Design of Production Systems**, Reinhold Publishing Company, New York City, 481 pages, May, (1966). This book was translated into Rumanian.

Unpublished Manuscripts:

- **Dynamic Programming: Models and Applications**; Lecture notes in manuscript form, to be submitted for publication.
- **Risk and Uncertainty in Activity Networks**, Lecture notes in manuscript form, to be submitted for publication.

Scientific Publications—Published Papers (or Accepted for Publication)

1. “A Note on Production Scheduling by the Use of Transportation Method”, Letter to the Editor., *Oper. Res.* 5 (1957), 565–566.
2. “Design of In-Process Storage Facilities”, *J. Ind. Eng.* 8 (1957); co-authored with Eugene Richman.
3. “Probabilistic Considerations in Equipment Replacement Studies”, *The Engineering Economist*, 4, Summer 1958. This paper was awarded first place at the graduate level in the 1958 contest conducted by the National Center of Education and Research in Equipment Policy.
4. “A Single-Sample Multiple-Decision Procedure for Selecting the Multinomial Event Which Has the Highest Probability”, *The Ann. of Math. Stat.* 38 (1959); co-authored with R. E. Bechhofer and N. Morse.
5. “An Approach to Linear Programming Under Uncertainty”, *Oper. Res.* 7 (1959), 208–216.

6. "Allocation Under Uncertainty When the Demand has a Continuous Distribution Function", *Management Sci.* 6 (1960), 270–294.
7. "On the Feedback Approach to Industrial Systems Design", *Management Sci.: Models and Techniques*, Vol. 1, Pergamon Press, N.Y., (1960), 149–167. Paper presented to the 6th International TIMS Meeting in Paris, September 1959.
8. "Research in Computerized Production Control Systems", *presented to the 13th Annual Conference, The Institute of Industrial Engineers, and printed in the Proceedings*, (1962), 269–279.
9. "A Note on the Problem of 'Explosion' and 'Netting' in the Planning of Material Requirements", *Oper. Res.* 11 (1963), 530–535.
10. "On the Control of Production in Small Job Shops", *J. Ind. Eng.* 14 (1963), 186–196; co-authored with R. T. Cole.
11. "On the Dynamic Programming Approach to the 'Caterer' Problem", *J. Math. Anal. And Appl.* 8 (1964), 202–217.
12. "An Algebra for the Analysis of Generalized Activity Networks", *Management. Sci.* 10 (1964), 494–514.
13. "A Dynamic Model for the Optimal Loading of Linear Multi-Unit Shops", *Management Tech.* 4 (1964), 47–58; co-authored with A. S. Ginsberg.
14. "Sensitivity Analysis of Multi-Terminal Flow Networks", *Oper. Res.* 12 (1964), 680–688.
15. "On the Relationship Between the Cut-Tree and the Fundamental Cut-Set of Multi-Terminal Flow Networks", *Jour. Franklin Inst.* 278 (1964), 262–266.
16. "An Operational System for the Smoothing of Batch Type Production", *Management Sci., Series B.* 12 (1966), B433-B449; co-authored with J. Jeske and R. O'Malley.
17. "On the Generalized Activity Networks", *J. Ind. Eng.* 17 (1966), 621–631, Special issue on Research in Industrial Engineering.
18. "On the Expected Duration of PERT Type Networks", *Management Sci., Series A,* 13 (1967), 229–306.
19. "The Determination of Optimal Activity Duration in Project Scheduling", *J. Ind. Eng.* 19 (1968), 48–51.
20. "The One Machine Sequencing Problem with Delay Costs", *J. Ind. Eng.* 19 (1968), 105–108.
21. "The Sequencing of 'Related' Jobs", *Nav. Res. Log. Quart.* 15 (1968), 23–32.
22. "The Role of Modeling in IE Design", *J. Ind. Eng.* 19 (1968), 292–305. Paper presented to the June 1967 Annual Meeting, ASEE, East Lansing, Michigan.
23. "The Sequencing of n Jobs on m Parallel Processors with Extensions to the Scarce Resources Problem of Activity Networks"; presented at the *Inaugural Conference, the Scientific Computation Center, Cairo, Egypt, December 17–20, (1969); and appeared in the Proceedings of the Conference, 230–255.*
24. "The Machine Sequencing Problem: Review and Extensions", *Nav. Res. Log. Quart.* 15 (1968), 205–232. Invited paper presented at the Symposium on Production Sequencing and Control, Stevens Institute of Technology, December 1967.

25. "A Loading Problem in Process Type Production", *Oper. Res.*, 16 (1968); also published in Cuadernos de Estadística Aplicado e Investigación Operativa, Vol. VI, Fasc. 3, Ano. (1969), 902–914.
26. "The Concept of State in Discrete Dynamic Programming", (1970), *J. Math. Anal. & Appl.* 29(3): 523–557.
27. "The Scheduling of Lots on a Single Facility", *IIE Trans.* 2 (1970), 203–213; co-authored with A. Mallik and H. L. W. Nuttle.
28. "Theory of Network Models and Management Science, Part I," (1970), *Management Sci.* 17(1): 1–34.
29. "Theory of Network Models and Management Science, Part II," (1970), *Management Sci.* 17(2): B54–B71.
30. "A Graph theoretic interpretation of the sufficiency conditions for contiguous binary switching (CBS)-rule," (1971), *Nav. Res. Log. Quart.* 18(3): 339–344.
31. "Hyperbolic Programming with a Single Constraint and Upper-Bounded Variables," (1972), *Management Sci.* 19(1): 42–45; with S. Arisawa.
32. "On the Sequencing of n Jobs on One Machine to Minimize the Number of Jobs Late," (1972), Letter to the Editor, *Management Sci.* 18(7): 389.
33. "Optimal Time-Cost Trade-Offs in GERT Networks," (1972), *Management Sci.* 18(11): 589–599; with S. Arisawa.
34. "Optimization of Batch Ordering Under Deterministic Variable Demand," (1972), *Management Sci.* 18(9): 508–517; with V. Y. Bawle.
35. "On the Scheduling of Jobs on a Number of Identical Machines," (1974), *IIE Trans.* 6: 1–13; with S. Park.
36. "The Scheduling of a Multi-Product Facility," (1973), *Proceedings of the Symposium of Theory of Scheduling and Its Applications*, Springer-Verlag, November, pp. 244–277; with A. K. Mallik.
37. "Sequencing jobs on a single machine to minimize total weighted tardiness when all jobs have same due date," (1975), *Oper. Res.* 23: B371, Suppl.2; with J. W. Allen and H. L. W. Nuttle.
38. "Branch-and-Bound Revisited: A Survey of Basic Concepts and Their Applications in Scheduling", *Modern Trends in Logistics Research, Chapter 8, the MIT Press*, (1976), 133–205, W. H. Marlow, Ed; co-authored with A. N. Elshafei.
39. "The 'Hub' and 'Wheel' Scheduling Problem. Part I: The 'Hub' Scheduling Problem: The Myopic Case. Part II: The 'Hub' Operation Scheduling Problem (HOSP): Multi-Period and Infinite Horizon, and the Wheel Operations Scheduling Problem (WOSP)", *Transportation Sci.* 11 (1977), Part I: 24–146, Part II: 147–165; co-authored with S. Arisawa.
40. "An Extended Basic Period Approach to the Economic Lot Scheduling Problem (ELSP)," *Proceedings, the 4th International Conference on Production Research*, Tokyo, Japan, August 27–30, (1977); Proceedings of 4th ICPR.
41. "The Economic Lot Scheduling Problem (ELSP): Review and Extensions," (1978), *Management Sci.* 24(6): 587–598.
42. "Activity Networks: Their Uses and Misuses in Project Planning and Control," Presented at International Conference on Systems Modeling in Developing

- Countries, May 8–11, (1978), Asian Inst. of Tech., Bangkok, Thailand. Appeared as *Chapter 4 in Systems Models for Decision Making, Asian Inst. of Tech.*, May (1978).
43. “Optimal Project Compression with Due-Dated Events,” (1979), *Nav Res Log Quart* 26(2): 331–348; with P. Simin Pulat. Presented at the ORSA/TIMS Meeting, November 7–9, (1977), Atlanta, GA.
 44. “Some OR Approaches to Automobile Gear Train Design,” (1979), *Math. Prog Study* 11(Oct): 150–175, with S. Metwalli and C. F. Zorowski.
 45. “Knapsack-Based Approaches to the Makespan Problem on Multiple Processors,” (1980), *IIE Trans.* 12(1): 87–96; with A. Elimam.
 46. “On the Measurement of Complexity in Activity Networks,” (1980), *EJOR* 5(4): 223–234; with Willy S. Herroelen.
 47. “Design Parameters of a Mounted Tree Planter for Optimum Productivity”, *Proceedings of the Winter Conference of ASAE*; (1978) co-authored with Susan Dillehunt, W. Hafley, A. Hassan and S. Metwalli.
 48. “Recent Advances in Activity Networks”. Presented at the International Conference on Industrial Systems Engineering and Management in Developing Countries; Bangkok, Thailand, November 3–6, (1980), and appeared in the *Proceedings of the ISEMDC*.
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