

Curriculum Vitae

ADAM SHWARTZ

Date: March 2010

PERSONAL DATA

Citizenship: Israel, ID. no. 051924090, passport no. 10210883
Birth: May 1, 1953, Tel-Aviv, Israel
Family status: Married, three children
Military service: Active service 1971-1977. Reserve duty: 1977-2001. Rank: Major.
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EDUCATION

1979 B.Sc. (Cum Laude), Electrical Engineering, Ben-Gurion University, Israel
1979 B.Sc. (Cum Laude), Physics, Ben-Gurion University, Israel
1981 Sc.M. Applied Mathematics, Brown University, Providence, R.I., U.S.A.
1983 Ph.D. Electrical Engineering, Brown University, Providence, R.I., U.S.A.
Thesis advisor: Prof. H.J. Kushner.

ACADEMIC EMPLOYMENT

1982-1983 Visiting Assistant Professor, Division of Applied Mathematics, Brown University.
1983-1984 Visiting Assistant Professor, Electrical Engineering Department, University of Maryland, College Park.
1984-present Electrical Engineering, Technion, Israel.
1990-1991 Systems Research Center, University of Maryland, College Park.
1996-1997 Mathematical Research Center, Bell Laboratories.

- Jan-July 1997 Management Science and Information Systems, Graduate School of Business,
Rutgers University.
- 2003– Professor, Electrical Engineering, Technion, Israel.
- 2006– The Julius M. and Bernice Naiman Chair in Engineering, Technion.

TEACHING EXPERIENCE

1. At the Technion:

A] UNDERGRADUATE LEVEL:

- 044130 Signals and Systems
044202 Random Signals 044105 Electrical Engineering “M”
044261 Structure and interpretation of computer programs I.

B] GRADUATE LEVEL:

- 048868 Stochastic Processes in Communication and Control
048868 Foundations of Stochastic Processes (new name)
048944 Large Deviations and Applications

C] GRADUATE LEVEL—NEW COURSES INTRODUCED:

- 048913 Stochastic Control.
048928 Adaptive Estimation—Stochastic Methods.
048846 Asymptotic methods—Large Deviations
048876 Topics in computer communication networks III:
Asymptotic methods. 048962 Topics in computer communication networks IV:
Stochastic models. With Dr. Rami Atar.
048846 Topics in computer communication networks I: Modelling and optimization of
computer communications networks.

2. At the University of Maryland, College Park:

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|-----------|--|------------------------|
| ENEE 608 | Graduate seminar: topics in
Control and Communication | Fall 1983, Spring 1984 |
| | Faculty seminar on Large Deviations | Spring 1984 |
| ENEE 608J | Graduate seminar: Large Deviations | Fall 1990 |

3. Elsewhere:

Columbia University

- Graduate course: Large deviations Autumn 1994/5

Rutgers University, Graduate School of Business

- Business Statistics Spring 1996/7

SCIENTIFIC SOCIETIES

Senior Member — IEEE.

Member—AMS, $\Sigma\Xi$, SIAM, INFORMS, Israel Mathematical Union, Operations Research Society of Israel.

PROFESSIONAL ACTIVITIES

Associate Editor, Mathematics of Operations Research, 2009–

Associate Editor, Stochastic Systems, 2009– (the new Journal of the Applied Probability Society, INFORMS, starting in 2009. Issued jointly with IMS and INFORMS).

Associate Editor, QUESTA, 2002– .

Reviewer for Mathematical Reviews, 2000– .

Associate Editor, SIAM J. Control and Optimization, 1994–2002.

Associate Editor, IEEE Transactions on Automatic Control, 1990–1992.

LIST OF PUBLICATIONS

A. Refereed journal papers

1) Published or accepted for publication

1. H.J. Kushner, A. Shwartz, “An invariant measure approach to the convergence of Stochastic Approximations with state-dependent noise,” *SIAM J. Control Opt.* **22** no. 1, pp. 13-27, 1984.
2. H.J. Kushner, A. Shwartz, “Weak convergence and asymptotic properties of adaptive filters with constant gains,” *IEEE Trans. Info. Theory* **IT-30** No. 1, pp. 177-182, 1984.
3. H.J. Kushner, A. Shwartz, “Stochastic approximations in Hilbert space: identification and optimization of linear continuous-parameter systems,” *SIAM J. Control Opt.* **23** no. 2, pp. 774–793, 1985.
4. F. Baccelli, A. M. Makowski and A. Shwartz, “The Fork-Join queue and related systems with synchronization constraints: Stochastic Ordering and computable bounds,” *Advances in Applied Probability* **21**, pp. 629-660, 1989.
5. E. Altman and A. Shwartz, “Optimal priority assignment: a time sharing approach,” *IEEE Transactions on Automatic Control* **AC-34**, pp. 1098-1102, 1989.
6. A. Shwartz and N. Berman, “Abstract stochastic approximations and applications”, *Stochastic Proc. Appl.* **31** pp. 133-149, 1989.
7. A. Shwartz, M. Sidi, “Erasure, capture and noise errors in controlled multiple-access networks”, *IEEE Trans. Comm. Theory* **37** No. 11, pp. 1228-1231, 1989.

8. A. Shwartz and A. M. Makowski, "Comparing policies in Markov decision processes: Mandl's lemma revisited," *Math. Operations Research* **15** pp. 155–174, 1990.
9. D. -J. Ma, A. M. Makowski and A. Shwartz, "Stochastic approximation for finite state Markov chains," *Stochastic Processes and Their Applications* **35** pp. 27–45, 1990.
10. E. Altman and A. Shwartz, "Adaptive Control of constrained Markov chains," *IEEE Trans. Auto. Control* **36**, pp. 454–462, 1991.
11. E. Altman and A. Shwartz, "Adaptive Control of constrained Markov chains: criteria and policies," *Annals of Operations Research* **28** pp. 101–134, 1991.
12. E. Altman and A. Shwartz, "Sensitivity of constrained Markov decision processes," *Annals of Operations Research* **32**, pp. 1-22, special volume on "Stochastic Models and their Application," F.J. Radermacher and U. Rieder Editors, 1991.
13. E. Altman and A. Shwartz, "**Markov decision problems and state-action frequencies**," *SIAM J. Control and Optimization* **29** pp. 786–809, 1991.
14. J.D. Biggins, B. Lubachevsky, A. Shwartz and A. Weiss, "A Branching Random Walk with a Barrier," *Annals of Applied Probability* **1** pp. 573–581, 1991.
15. B. Lubachevsky, A. Shwartz and A. Weiss, "An analysis of rollback-based simulations," *ACM Transactions on Modelling and Computer Simulation* **1** no. 2, pp. 154–193, 1991.
16. A. M. Makowski and A. Shwartz, "Stochastic approximations and adaptive control of a discrete-time single-server network with random routing," *SIAM J. Control Opt.* **30**, pp. 1476–1506, 1992.
17. A. M. Makowski and A. Shwartz, "On constrained optimization of the Klimov network and related Markov decision processes," *IEEE Trans. Automatic Control* **38** No. 2 pp. 354–359, 1993.
18. E. Altman and A. Shwartz, "Time-sharing policies for controlled Markov chains," *Operations Research*, 1993.
19. N. Shimkin and Adam Shwartz, "Guaranteed performance regions for Markovian systems with competing decision makers," *IEEE Trans. Auto. Control* **38** No. 1 pp. 84–95, 1993.
20. A. Shwartz and A. Weiss, "Induced rare events: analysis via large deviations and time reversal," *Journal of Applied Prob.* **25** pp. 667–689, 1993.
21. David Levanony, Adam Shwartz and Ofer Zeitouni, "A Uniform decay and equicontinuity for normalized, parameter dependent Ito integrals," *Stochastics* **43**, pp. 9–28, 1993.
22. E. Feinberg and A. Shwartz, "**Markov decision models with weighted discounted criteria**," *Math. of Operations Research* **19** pp. 152–168, 1994.
23. David Levanony, Adam Shwartz and Ofer Zeitouni, "Recursive identification in continuous-time stochastic processes," *Stoch. Proc. and their Applications* **49**, pp. 245–275, 1994.

24. E. Feinberg and A. Schwartz, “**Constrained Markov decision models** with weighted discounted criteria,” *Math. of Operations Research* **20** pp. 302–320, 1995.
25. N. Shimkin and A. Schwartz, “**Asymptotically Efficient Adaptive Strategies** in Repeated Games, Part I: Certainty Equivalence Strategies,” *Math. of Operations Research* **20** pp. 743–767, 1995.
26. N. Shimkin and A. Schwartz, “Asymptotically Efficient Adaptive Strategies in Repeated Games, Part II: Asymptotic Optimality,” *Math. of Operations Research* **21** pp. 487–512, 1996.
27. E. Feinberg and A. Schwartz, “**Constrained discounted dynamic programming**,” *Math. of Operations Research* **21** pp. 922–945, 1996.
28. Eugene A. Feinberg and Adam Schwartz, “**Constrained dynamic programming** with two discount factors: applications and an algorithm,” *IEEE Transactions on Automatic Control* TAC-44 pp. 628–630, 1999.
29. E. Altman and A. Schwartz, “**Constrained Markov Games: Nash Equilibria**,” *Annals of Dynamic Games* **6** pp. 213–221, V. Gaitsgory, J. Filar and K. Mizukami, editors, Birkhäuser, 2000.
30. E. Altman, E. Feinberg and A. Schwartz, “**Weighted Discounted Stochastic Games** with Perfect Information,” *Annals of Dynamic Games* **6** pp. 303–323, V. Gaitsgory, J. Filar and K. Mizukami, editors, Birkhäuser, 2000.
31. Martin I. Reiman and Adam Schwartz, “**Call Admission: A New Approach to Quality of Service**,” *Queueing Systems* **38** pp. 125–148, 2001.
32. Arie Hordijk and A. Schwartz, “**Performance bounds for queues via generating functions**,” *IEEE Trans. Aut. Control* **46** pp. 137–142, 2001.
33. A. Schwartz, “**Death and discounting**,” *IEEE Trans. Auto. Control* **46** pp. 644–647, 2001.
34. R. Atar, P. Dupuis and A. Schwartz, “**An escape time criterion in queueing networks**: Asymptotic risk-sensitive control via differential games,” *Math. of Operations Research* **28** pp. 801–835, 2003.
35. M. Jacobson, N. Shimkin and A. Schwartz, “**Markov decision processes** with slow scale periodic decisions,” *Math. of Operations Research* **28** pp. 777–800, 2003.
36. R. Atar, P. Dupuis and A. Schwartz, “**Explicit solutions for a network control problem** in the large deviations regime,” *QUESTA* **46** pp. 159–176, 2004.
37. A. Schwartz and A. Weiss, “**Large Deviations with diminishing rates**,” *Math. of Operations Research* **30** pp. 281–310, 2005.
38. A. Ridder and A. Schwartz, “**Large deviations without principle: join the shortest queue**,” *Math. Methods of Operations Research* **62** no. 3 pp. 467–483, December 2005. See also the expanded versions in [ps](#) or [pdf](#) format. Special volume for Hordijk.
39. A. Zadorojniy and A. Schwartz, “**Robustness of policies** in constrained Markov Decision processes,” *IEEE Trans. Auto. Control* **51** pp. 635–638, April 2006. [ps version](#).

40. A. Leizarowitz and A. Shwartz, “Exact finite approximations of average-cost countable Markov Decision processes,” *Automatica* **4** pp. 1480–1487, June 2008. CCIT Report 616, EE PUB 1573, April 2007.
41. R. Atar and A. Shwartz, “Efficient routing in heavy traffic under partial sampling of service times,” *Math. Operations Research* **33** pp. 899–909, Nov. 2008. CCIT Report 640, EE PUB 1597, October 2007.
42. Y. Carmon and A. Shwartz, “Markov decision processes with exponentially representable discounting,” *Operations Research Letters* **37** pp. 51–55, Jan. 2009. CCIT Report 675, March 2008.
43. E. Altman, K. Avrachenkov, I. Menashe, G. Miller, B. Prabhu and A. Shwartz, “Dynamic discrete power control in cellular networks,” CCIT Report 675, December 2007. *IEEE Trans. Auto. Control* **54** pp. 2328–2340, Oct. 2009.
44. A. Zadorojniy G. Even and A. Shwartz, “A strongly polynomial algorithm for controlled queues.” *MOR* **34** pp. 992–1007, Nov. 2009.
45. A. Shwartz and A. Weiss, “Uniqueness of a variational problem, with applications to large deviations for buffer overflow,” *IEEE Trans. Auto. Control* **55** pp. 425–430, Feb. 2010. CCIT Report 646, EE PUB 1603, November 2007.

For other refereed papers see items 5,7 in Section B.

2) Submitted

46. Rami Atar, Yair Y. Shaki and Adam Shwartz, ”A blind policy for equalizing cumulative idleness,” CCIT Report 270, 2.2009. Submitted.

B. Books and chapters in books

1) Monograph

1. A. Shwartz and A. Weiss, *Large deviations for performance analysis: queues, communication and computing*, Chapman-Hall, 1995. Second printing: 1997.
This is a monograph containing previously unpublished results. These include Large Deviations for processes with discontinuous statistics, Large Deviations for a “finite levels” process, as well 5 chapters (over 160 pages) of new, unpublished material concerning various applications.

2) Edited volumes

2. *Stochastic Analysis; Liber Amicorum for Moshe Zakai*, Academic Press, 1991. Edited by Eddy Mayer-Wolf, Ely Merzbach and Adam Shwartz.

3. **Handbook of Markov Decision Processes: Methods and Applications**. Edited by Eugene A. Feinberg and Adam Schwartz. Kluwer, 2002.

This book contains refereed contributions from most of the leading experts on MDP's.

3) Chapters in books

4. A. Schwartz, "**Discrete Time Markov Processes**," in *The Control Handbook*, Edited by W.S. Levine, CRC Press, 1995.

5. A. Schwartz and A. M. Makowski, "**The Poisson equation** for countable Markov chains: probabilistic methods and interpretations," pp. 269–303 in *Handbook of Markov Decision Processes: Methods and Applications*, A collection of refereed papers, Edited by Eugene A. Feinberg and Adam Schwartz, Kluwer, 2002.

This is a refereed research paper containing original material.

6. E. Feinberg and A. Schwartz, "Introduction," pp. 1–17 in *Handbook of Markov Decision Processes: Methods and Applications*, a collection of refereed papers, Edited by Eugene A. Feinberg and Adam Schwartz, Kluwer, 2002.

This is an introduction to the mathematical structure, as well as a brief survey of the state of the art in MDP's.

7. E. Feinberg and A. Schwartz, "Mixed criteria," pp. 209–230 in *Handbook of Markov Decision Processes: Methods and Applications*, a collection of refereed papers, Edited by Eugene A. Feinberg and Adam Schwartz, Kluwer, 2002.

This is a refereed survey paper on Mixed criteria Markov Decision Processes.

C.1 Refereed conference papers

* denotes papers containing original material, not included in the papers listed in A. above.

1. H.J. Kushner and A. Schwartz, "Convergence of Stochastic Approximations with State Dependent Noise under Weak Conditions", Proc. 21st IEEE Conference on Decision and Control, vol.2, pp. 517-521, Orlando, Florida, December 1982.
- 2*. F. Baccelli, A. M. Makowski and A. Schwartz, "Simple computable bounds and approximations for the Fork-Join queue", EE pub. 527, Technion, 1985 and in *Computer Networking and Performance Evaluation*, pp. 437-450 (Proc. IFIP International Seminar, Tokyo, Japan September 1985), edited by T. Hasegawa, H. Takagi, Y. Takahashi, North-Holland 1986.
- 3*. A. M. Makowski and A. Schwartz, "Implementation issues for Markov decision Processes", workshop on Stochastic Differential Systems, Stochastic Control Theory and Applications, Institute of Mathematics and its applications, University of Minnesota June 1986 (invited paper), IMA volumes in Mathematics and its applications, volume 10, edited by W. Fleming and P.-L. Lions, Springer Verlag 1988, EE Pub. No. 607, Technion, November 1986.

- 4*. A. Shwartz, A. M. Makowski, "An optimal adaptive scheme for two competing queues with constraints", in *Analysis and Optimization of Systems*, pp. 515-532 (Proc. 7th International Conference, Antibes, France, June 1986), edited by A. Bensoussan, J. L. Lions, Lect. Notes Control and Info. Sci. no. 83, Springer Verlag 1986.
- 5*. A. Shwartz, "On convergence of the cost under adaptive policies," Proc. 25th IEEE Conference on Decision and Control, vol. 3 pp. 1931-1932, Athens, Greece, December 1986.
- 6*. T. Shukhman and A. Shwartz, "On random multiple access with unknown interference probabilities", Proc. 25th IEEE Conference on Decision and Control, Vol. 3 pp. 2090-2091, Athens, Greece, December 1986.
7. A. Shwartz and M. Sidi, "Erasure, capture and noise errors in controlled multiple access networks", Proc. 25th IEEE Conference on Decision and Control, vol. 2 pp. 1333-1334, Athens, Greece, December 1986 (Invited paper).
- 8*. D. -J. Ma, A. M. Makowski and A. Shwartz, "Estimation and optimal control for constrained Markov chains", EE Pub. 605, Technion, October 1986, Proc. 25th IEEE Conference on Decision and Control, vol. 2 pp. 994-999, Athens, Greece, December 1986 (Invited paper).
- 9*. D. -J. Ma, A. M. Makowski and A. Shwartz, "Stochastic Approximations for Constrained Markov Decision Processes", EE Pub. 625, May 1987, Proc. of the 1987 International Symposium on the Mathematical Theory of Networks and Systems, Phoenix, Arizona June 1987 (Invited paper). In *Analysis and Control of Nonlinear Systems*, pp. 45-50 Edited by C. I. Byrnes, C. F. Martin and R. E. Saeks, North Holland, Amsterdam 1988.
10. E. Altman and A. Shwartz, "Markov optimization problems: state-action frequencies revisited", 27th IEEE Conference on Decision and Control, Austin, Texas, Vol. 1 pp. 640-645, December 1988 (Invited paper).
- 11*. N. Shimkin and A. Shwartz, "Control of queues under partial information", 28th IEEE Conference on Decision and Control, Florida, December 1989 (Invited paper).
12. B. Lubachevsky, A. Shwartz and A. Weiss, "Rollback sometimes works ... if filtered", Winter Simulation Conference, Washington DC, December 1989.
13. E. Feinberg and Adam Shwartz, "Weighted discounted dynamic programming," 30th IEEE Conference on Decision and Control, Brighton, England, Vol. 1 pp. 485-486, December 1991.
14. A.M. Makowski and Adam Shwartz, "Optimal index policies for Markov decision processes with a constraint," 30th IEEE Conference on Decision and Control, Brighton, England, Vol. 1 pp. 471-476, December 1991.
15. N. Shimkin and Adam Shwartz, "Guaranteed performance regions for Markov models," SRC 91-7, University of Maryland, 30th IEEE Conference on Decision and Control, Brighton, England, Vol. 1 pp. 459-464, December 1991.
16. Y. Carmon and A. Shwartz, "Eventually-stationary policies for Markov decision processes with non-constant discounting," [ValueTools](#), Athens, October 2008.

17. iE. Altman, P. Nain, A. Shwartz and Y. Xu, "Predicting the impact of measures against P2P networks on the transient behavior of a torrent," Submitted, Performance 2010.

C.2 Other Conference papers

1. N. Shimkin and A. Shwartz, "Guaranteed performance regions for multi-user Markovian models," proceedings of workshop, University of Kansas, September 1991, In *Stochastic Theory—Adaptive Control*, Edited by T.E. Duncan and B. Pasik-Duncan, Lecture Notes in Control and Information Sciences 184, Springer Verlag, New York 1992.
2. A. Shwartz and R. Levi, "Throughput-Delay tradeoff with impatient arrivals," Proc. 23 Allerton Conference on Communications, Control and Computing, Illinois, 1994,
3. A. Shwartz, "Large Deviations for performance analysis," Proc. of The Lunteren Conference, Lunteren, Holland, January 1995, and CC PUB 126, Electrical Engineering, Technion, 1995.
4. E. Altman and A. Shwartz, "Optimal priority assignment with general constraints", Proceedings of the 24th Allerton Conf., Illinois, October 1986.
5. N. Berman and A. Shwartz, "Stochastic Approximations for Distributed Parameter Systems", Proc. 25th Allerton Conference on Communication, control and computing, Allerton House, University of Illinois at Urbana-Champaign, Illinois, October 1987.
6. B. Lubachevsky, A. Weiss and A. Shwartz, "Efficiency of a Rollback simulation algorithm", 1989 SIAM Annual Meeting, San Diego, California, July 1989.
7. E. Altman and A. Shwartz, "Adaptive Control of constrained Markov chains" 14th Symposium on Operations Research, Ulm, Germany, September 1989.
8. D. Levanony, A. Shwartz and O. Zeitouni, "Continuous time recursive identification", BILCON 1990, Turkey, in *Communication, Control and Signal Processing*, E. Erikan Ed., pp. 1725-1732, Elsevier 1990.
9. A. Shwartz and A. Weiss, "Bit dropping in ATM: a large deviations analysis," Proc. Workshop on ATM Traffic Management, Ecole Nationale Supérieure des Telecommunications (ENST), Paris, France, December 1995, CC PUB 126, Electrical Engineering, Technion, November 1995.

D. Selected Reports

- Neil O'Connell and Adam Shwartz, "Tunneling from random walks to Markov chains," Report, BRIMS, HP-Labs, Bristol, March 1998.
- A. Shwartz and A. Weiss, "Multiple time scales in Markovian ATM models I. Formal calculations." CC PUB 267, pp. 1–50, Electrical Engineering, Technion, 1999.
- M. Jacobson, N. Shimkin and A. Shwartz, "Piecewise stationary Markov Decision Processes - I: Constant gain." CC PUB 296, pp. 1-29, Nov. 1999.

- M. Jacobson, N. Shimkin and A. Schwartz, “Piecewise stationary Markov Decision Processes - II: State-dependent gain.” CC PUB 297, pp. 1-28, Nov. 1999.
- A. Ridder and A. Schwartz, “Large Deviations methods and the Join the Shortest Queue model.” EE PUB 1467, CCIT PUB 516, Technion, Feb. 2005. An expanded version of the MMOR paper, 2005.

INTERNATIONAL CONGRESSES

* denotes conferences where attendance is limited, by personal invitation.

1. 21st IEEE Conference on Decision and Control, Orlando, Florida, December 1982; “Convergence of Stochastic Approximations with State Dependent Noise under Weak Conditions”, with H. J. Kushner.
2. 7th International Conference on Analysis and Optimization of Systems, Antibes, France, June 1986; “An optimal adaptive scheme for two competing queues with constraints”, with A. M. Makowski.
3. 24th Allerton Conference on Communication, control and computing, Allerton House, University of Illinois at Urbana-Champaign, Illinois, October 1986; “Optimal priority assignment with general constraints”, with E. Altman.
4. 25th IEEE Conference on Decision and Control, Athens, Greece, December 1986; “On Convergence of the Cost Under Adaptive Policies”.
“On Random Multiple Access with Unknown Interference Probabilities”, with T. Shukhman.
“Erasure Capture and Noise Errors in Controlled Multiple Access Networks”, with M. Sidi. “Estimation and Optimal Control for Constrained Markov Chains”, with D. -J. Ma and A. M. Makowski.
5. First International Conference on Industrial and Applied Mathematics, Paris, July 1987; “Non Stationary Control Policies with Applications to Adaptive Control of Queues”, with E. Altman.
6. International Conference on Modeling and Control of Queueing Networks, France 1987; “Non Stationary Policies for Markov Chains and Discrete Time Queues” (Invited paper).
7. 25th Allerton Conference on Communication, control and computing, Allerton House, University of Illinois at Urbana-Champaign, Illinois, October 1987; “Stochastic Approximations for Distributed Parameter Systems”, with N. Berman.
8. EURO IX—TIMS XXVIII, Universite Paris IX—Dauphine, Paris, July 1988; “Non stationary optimal policies for Markov chains and for queueing systems” (invited paper), with E. Altman.
“Time sharing policies for Markov decision problems”, with E. Altman.
9. 27th IEEE Conference on Decision and Control, Austin, Texas, December 1988; “Markov optimization problems: state-action frequencies revisited”, with E. Altman.

10. 14th Symposium on Operations Research, Ulm, Germany, September 1989; “Adaptive Control of Stochastic Systems” (invited paper), “Adaptive Control of constrained Markov chains”, with E. Altman.
11. International Conference on Game Theory and Economics, SUNY at Stony Brook, July 1990; “Approachability for irreducible stochastic games with vector payoffs”, with N. Shimkin.
12. The Sixth Yale Conference on Adaptive Control, Yale, New Haven, August 1990; “Adaptive Control of Constrained Markov Chains”, with E. Altman.
13. ORSA/TIMS Special Interest Conference on Applied Probability in the Engineering, Informational and Natural Sciences, Monterey, California January 1991; “Optimal scheduling under constraints”.
14. * Stochastic Theory—Adaptive Control, workshop, University of Kansas, September 1991, “Guaranteed performance regions for Markov models,” with N. Shimkin.
15. 30th IEEE Conference on Decision and Control, Brighton, England, December 1991. “Weighted discounted dynamic programming,” with E. Feinberg. “Optimal index policies for Markov decision processes with a constraint,” with A.M. Makowski. “Guaranteed performance regions for Markov models,” with N. Shimkin.
16. SIAM Conference on Control and its Applications, IMA, University of Minnesota, MN, September 1992, “Markov decision processes with weighted discounted rewards,” with E. Feinberg.
17. Conference on Applied Probability—INRIA/ORSATIMS/SMIAI, Paris, June 1993, “Markov decision models with weighted discounted rewards,” with E. Feinberg. “Aloha, Aloha,” with A. Weiss. “Guaranteed performance regions for multi-user semi-Markov models,” with R. Levi and N. Shimkin.
18. * Large Deviations—Stanford, August 5–6, 1993, “Aloha, Aloha,” with A. Weiss.
19. ORSA/TIMS Conference, Boston, April 1994 (Applied Probability Cluster); “Bit Dropping in ATM via Large Deviations,” with A. Weiss, “Large deviations for jump-Markov processes via time-change and contraction,” with O. Zeitouni. “New policies for discounted Markov Decision processes under constraints,” with E. Feinberg.
20. 23 Allerton Conference on Communications, Control and Computing, Illinois, September 1994, “Throughput-Delay tradeoff with impatient arrivals,” with R. Levi.
21. * Applied Probability, Oberwolfach, December 1994, “New models and policies in discounted dynamic programming,” with E. Feinberg (invited speaker).
22. * Stochastic Models, Leiden, Holland, December 1994, “Markovian Models: performance regions, approachability and stochastic games.” (invited speaker).
23. Applied Probability Conference, Atlanta, Georgia, June 1995, “Throughput-Delay Tradeoff with Impatient Arrivals,” with R. Levi. “Constrained Discounted and Weighted Discounted Markov Decision Processes,” with E. Feinberg.

24. * Workshop on Problems in the Theory and Application of Networks, Edinburgh, Scotland, August 1995, “Controlling ATM networks: A large deviations analysis,” with A. Weiss. (invited speaker).
25. Workshop on ATM Traffic Management, Ecole Nationale Supérieure des Telecommunications (ENST), Paris, France, December 1995, “Bit dropping in ATM: A large deviations analysis,” with A. Weiss.
26. * The Lunteren Conference, Lunteren, Holland, January 1996, “Large Deviations for Performance Analysis,” invited minicourse: 3 two-hour lectures.
27. INFORMS Applied Probability section Conference, Boston, June 1997, “Models of packet transmission: asymptotic analysis,” with A. Weiss.
28. * Stochastic modelling and analysis of communication networks Lund, Sweden, October 1-3, 1998, “Sample path large deviations” (keynote lecture).
29. * Stochastic networks; large deviations, stability and fluid models, The Lorentz center, Leiden University, Holland, October 26-30, 1998, “Sample-path large deviations for some network models” (invited speaker).
30. * Oberwolfach conference on Stochastic Networks, Oberwolfach, Germany, November 30-December 6, 1998, “Large deviations for some two-queue models.” (invited speaker).
31. Applied Probability conference, Ulm, Germany, July 26-28 1999. “Two time scale Markov decision processes,” with M. Jacobson and N. Shimkin.
32. * Modern Problems in Applied Probability, Sobolev Institute of Mathematics, Novosibirsk, Russia, August 21-26, 2000 “Join the shortest queue: large deviations without principle,” with A. Ridder. (invited speaker).
33. * International workshop on stochastic optimization and adaptation, Cochin, Karella, India, December 19-22 2000, “Large deviations without principle: Join the shortest queue,” with A. Ridder. (invited speaker).
34. Applied Probability conference, New York, New York, July 25–27, 2001. “Asymptotic risk sensitive exit time in controlled queueing networks via differential games,” with R. Atar and P. Dupuis.
35. * Mathematics of Stochastic Networks, EURANDOM, Eindhoven, Holland, 29.10–2.11, 2001. “Asymptotic risk sensitive exit time in controlled queueing networks via differential games,” with R. Atar and P. Dupuis. (invited speaker).
36. * Stochastic networks, Stanford Univ., 26–29.6.02. “Asymptotic Exit in Queueing Networks: Optimal Risk Sensitive Control via Differential Games,” with R. Atar and P. Dupuis.
37. * Modern problems in Applied Probability, Heriot-Watt Univ., Edinburgh, 22–28.8.02. “Large Deviations with diminishing rates,” with A. Weiss. (invited speaker). “Optimally controlled queueing networks in large deviations regime,” with R. Atar and P. Dupuis.

38. * Applied Probability, Oberwolfach, December 2003, “Optimal stochastic control in the large deviations domain,” with R. Atar, P. Dupuis and N. Shimkin.
39. 12th INFORMS/APS Conference, Beijing, China, June 23–25, 2004, “Optimal stochastic control in the large deviations domain,” with R. Atar, P. Dupuis and N. Shimkin.
40. * Stochastic Systems, Leiden, Holland, March 16-19, 2005. “Large deviations methods: some applications,” with A. Ridder (invited speaker).
41. Workshop on rare events and stochastic networks, Fields Institute, University of Ottawa, July 4–5, 2005. “Large Deviations with diminishing rates,” with Alan Weiss.
42. 13th INFORMS/APS Conference, Ottawa, Canada, July 6–8, 2005. “Large deviations for systems with hysteresis: a polling example,” with Maxim Ioshin.
43. Networks, queues, performance and stochastic modelling, Shefayim, Israel, May 17-19 2006. “Large deviations for polling systems,” with Maxim Ioshin.
44. 14th INFORMS/APS Applied Probability Conference, Eindhoven, Holland, July 9–11, 2007. “Exact approximations for Markov Decision processes,” with Arie Leizarowitz.
45. INFORMS Conference, Washington D.C., October 2008. “Eventually-stationary policies for Markov decision processes with non-constant discounting,” with Y. Carmon.
46. ValueTools 2008, Athens, October 2008. “Eventually-stationary policies for Markov decision processes with **non-constant discounting**,” with Y. Carmon.
47. 15th INFORMS Applied Probability Society Conference, Cornell, Ithaca, NY, July 2009. “Exact finite approximations of countable state MDPs,” with Arie Leizarowitz.
48. 15th INFORMS Applied Probability Society Conference, Cornell, Ithaca, NY, July 2009. “Blind, fair allocation between large server pools,” with Rami Atar and Yair Shaki.

Post-doctoral mentoring

Iddo Eliazar, 1997-8. currently with the Holon Institute of Technology.

Yair Shaki (jointly with Rami Atar), 2008-2010.

Silke Meiner, 2009.

GRADUATE STUDENTS

Ph. D.

Eitan Altman: “Controlled Markov chains under constraints”; Ph. D., June 1990. Currently Director of Research, INRIA, Sophia Antipolis and Invited Professor at the University of Avignon, Agroparc campus.

Nahum Shimkin: “Stochastic Control of Distributed Systems”; Ph. D., April 1992. Currently Associate Professor, Electrical Engineering, Technion.

David Levanony: “Recursive methods for identification in continuous-time stochastic Processes”; Ph. D., May 1992. Co-advisor: Prof. O. Zeitouni. Currently Senior Lecturer, Electrical and Computer Engineering, Ben Gurion University.

Gady Zalman: (temporary: permanent advisor: Ofer Zeitouni), June 1994–February 1995.

Rami Atar: (temporary: permanent advisor: Ofer Zeitouni. Substitute advisor: Prof. Zakai), December 1994–5 Currently Associate Professor, Electrical Engineering, Technion.

Silke Meiner: “Large Deviations of Generalised Jackson Networks,” Ph.D. Magna Cum Laude, Mathematics, Berlin Institute of Technology, 9.2008. Principal Advisor: Prof. J. D. Deuschel.

M.Sc.

Avital Wierzba: “Estimation of Random Telegraph signal from its noisy integral” (principal advisor: Prof. M. Zakai), August 1986. Ph.D., Weizman institute. Currently holding a senior position at Elta.

Michael Nehorai: “Recursive estimation in Semi-Markov models,” June 1990.

Rachel Levi: “A theory of approachability and throughput-delay tradeoff in a queue with impatient customers,” June 1994.

Ofir Sahar: (temporary: permanent advisor: Ofer Zeitouni), June 1994–1995.

Mathew Jacobson: “Two time scale Markov Decision processes.” M.Sc., October 1994–February 1999. (Co-advisor, together with Nahum Shimkin.) Ph.D. Electrical Engineering, University of Michigan, 2006, now in the Biotechnology industry.

Remi Menneson: (additional advisor: Prof. Moshe Sidi. Previous advisor: Prof. Ofer Zeitouni), November 1997-

Alexander Zadorojniy: “Constrained Markov decision processes with applications to wireless communications”. 2003–June 2004. A Ph.D. student, Electrical Engineering, Tel Aviv University.

Maxim Iosh: Large deviations for a polling system with exhaustive service. October 2003–September 2005. Currently at Intel.

National Activities

Member, ISF grant committee for Electrical Engineering, 1997/8

Chairman, ISF grant committee for Electrical Engineering (date withheld).

Technion major activities

Assistant to the EE dean for undergraduate studies 1994–1996.

Chair, committee on “Computer for every student,” (appointed by the senior vice president), May–July 1995.

Chair, committee on “Infrastructure for computer-assisted learning,” (appointed by the senior vice president), September 1995–March 1996.

Ad-hoc committee on basic courses, November 1997–July 1998.

Senate committee for undergraduate and graduate studies, January 1998–December 2000.
 November 1998–September 2000: Assistant (for “computerization”) to the Vice Provost for Undergraduate Studies.
 Chair, Technion Internet Site committee, November 1998–November 2000.
 August 1999–2000 Presidents committee on advanced technologies for teaching and distance learning.
 October 2000–June 2002: vice dean of undergraduate studies, for information technologies.
 November 2000–present: In charge of the Technion New Information Systems project—Matmon (deciding, choosing and implementing a Technion ERP system).
 January 2002–present: vice “Manmap” (vice president for administration and finance) for information systems (Since October 2005: deputy vice president for Information Systems.)
 In charge of the Matmon (Technion ERP) project, in charge of the Information Systems department at the Technion. November 2002–2004 Steering Committee for the Technion New Information Systems.

TECHNION COMMITTEES

Chair, committee on “Computer for every student,” (appointed by the senior vice president), May–July 1995.
 Chair, committee on “Infrastructure for computer-assisted learning,” (appointed by the senior vice president), September 1995–March 1996.
 1997–2000, departmental representative to the Technion senate
 Ad-hoc committee on basic courses, November 1997–July 1998.
 Permanent committee for undergraduate and graduate studies, January 1998–December 2000.
 ITTT Steering committee, October 1998–1999.
 Chair, Technion Internet Site committee, November 1998–November 2000.
 1999–Dec. 2000 Member, faculty appointment committee (“Vaada Mekhina”), department of Humanities and the Arts.
 August 1999–2000 Presidents committee on advanced technologies for teaching and distance learning.
 Technion Internet Site committee, December 2000–2002.
 November 2002– Steering Committee for the Technion New Administrative Information Systems.

TECHNION ACTIVITIES

1995–present: Advisor to students on the Technion Distinguished Student program.
 November 1998–September 2000: Assistant (for “computerization”) to the Vice Provost for Undergraduate Studies.
 October 2000–June 2002: vice dean of undergraduate studies, for information technologies.

Under the two titles above I was responsible for most of the computer systems serving students, faculty and administration, and served or chaired several steering committees. During this time the major systems serving the students were re-designed. This required an investment of 2-3 full days per week.

July–October 2000: project leader—designing a student-administration information system (undergraduate and graduate).

November 2000–present: In charge of the Technion New Information Systems project (deciding, choosing and implementing a Technion ERP system).

January 2002–present: vice “Manmap” (vice president for administration and finance) for information systems. In charge of the Matmon (Technion ERP) project, in charge of the Information Systems department at the Technion. As of October 2005: deputy vice president for Information Systems.

The Matmon project is a large scale project, and together with the responsibility for the IT department this required an investment of 4 full days a week (on average) during the period 6/2002–1/2004. Since then it is down to 1–2 days a week.

DEPARTMENTAL ACTIVITIES

1985-1986	Advisor to undergraduate students
1986-1987	Curriculum committee
1986–1990	Colloquium and seminar committee
1986–1990	Advisor to outstanding students
1991–1993	Colloquium and seminar committee
1991–1993	Advisor to students whose studies may be terminated
1991–1993	Organizer—faculty get-together
1994–1996	Assistant to the dean for undergraduate studies
1994–1996	Member—undergraduate curriculum committee
1994–1996	Member—budget committee
1994–1996	Member—student-faculty committee
1994–1996	Member—committee on undergraduate teaching
1997–2000	Representative to the Technion senate
1997–2000	Committee on distinguished staff
1999–	Member—graduate studies committee.
1999–2001	Member—subcommittee of the graduate studies committee, for prizes.
1999–	Member—subcommittee of the graduate studies committee, and for acceptance to the M.Sc. graduate program.
2001–	Member, committee for the promotion of female students and candidates to EE.
2005	Ad hoc committee on mandatory Mathematical courses for EE M.Sc. students.

EXTERNAL GRANTS

United-States Israel Binational Science Foundation grant no. 85-00306, with Prof. A. M. Makowski: “Adaptive Control of Markov Chains: Explicit Strategies and Approximations”.
September 1 1986—August 30 1989

Israeli Science Foundation grant no. 295-94-1 “Stochastic Control of Markov Systems with Multiple Discounts.”
October 1994—September 1996.

United-States Israel Binational Science Foundation grant, with Dr. Rami Atar, Dr. Alan Weiss and Prof. Paul Dupuis, “Performance and control of stochastic networks: asymptotic methods.”
October 2000—September 2004.

INTAS Project 265: “Mathematics of stochastic networks,” funded by the European community. A joint project between teams from several countries including Western and Eastern Europe, and Israel. Israeli team includes Offer Kella and Adam Shwartz. 2001–2003. Project budget - 90000 EU.