

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering

Approved by the Regents

May 14, 2009

Amy M. Cohn, assistant professor of industrial and operations engineering, Department of Industrial and Operations Engineering, College of Engineering, is recommended for promotion to associate professor of industrial and operations engineering, with tenure, Department of Industrial and Operations Engineering, College of Engineering.

Academic Degrees:

Ph.D. 2002 Massachusetts Institute of Technology, Operations Research, Cambridge, MA
A.B. 1991 Harvard University, Applied Mathematics, Cambridge, MA

Professional Record:

2002-present Assistant Professor, Department of Industrial and Operations Engineering, University of Michigan
1995-1996 Manager, Princeton Transportation Consulting Group
1991-1995 Analyst, Princeton Transportation Consulting Group

Summary of Evaluation:

Teaching: Professor Cohn is a gifted teacher at both the graduate and undergraduate level. She has taught IOE 310 "Introduction to Optimization" four times with enrollments exceeding 110 students per offering, IOE 510 "Linear Programming" with enrollments exceeding 30 students per offering, and IOE 640 "Mathematical Modeling of Operational Systems" twice with enrollments of six and twelve. In addition, she has developed and offered a new advanced graduate course IOE 591 "Models and Algorithms for Large-Scale Optimization Problems" three times. Professor Cohn's course evaluations are consistently among the best in the department. Students describe her as a dedicated, caring and inspiring mentor. Professor Cohn has repeatedly received outstanding teaching awards. She received the IOE undergraduate honor society Alpha Pi Mu Professor of the Year Award in 2003, 2004 and 2006 and the College of Engineering Jon R. and Beverly Holt Award for Excellence in Teaching in 2005 and 2007. Professor Cohn has been a highly productive mentor of Ph.D. students. She has chaired six Ph.D. committees and co-chaired a seventh and served as a member on 11 additional Ph.D. committees. One student is now an assistant professor at another institution; another received the Anna Valicek Medal for his doctoral research and is now a postdoctoral student in the IOE department.

Research: Professor Cohn is one of the top scholars in her cohort in the modeling of large complex systems. She couples her research on modeling with algorithm development to efficiently identify feasible optimal solutions. Her models and algorithms are sufficiently robust that they can be generalized to seemingly unrelated problems. She works on real applications that are characterized by reviewers as "important to society." Reviewers praise Professor Cohn's ability to apply mathematically sound theory to problems of great contemporary importance. The impact of her work can be evidenced by publications in leading journals and the increasing use of her research in scheduling of aircrews, medical residents, production, inventories and shipping. Professor Cohn has published several papers in leading archival journals; many of these are with her students. In addition, Professor Cohn has several refereed and non-refereed conference proceedings.

Recent and Significant Publications:

- A. Cohn, M. Magazine, and G. Polak, "Rank-Cluster-and-Prune: An Algorithm for Generating Clusters in Complex Set Partitioning Problems," *Naval Research Logistics*, to appear.
- A. Barlatt, A. Cohn, Y. Fradkin, O. Gusikhin, and C. Morford, "Using Composite Variable Modeling to Achieve Realism and Tractability in Production Planning: An Example from Automotive Stamping," *IIE Transactions*, to appear.
- A. Cohn, S. Root, C. Kymissis, J. Esses, and N. Westmoreland, "Scheduling Medical Residents at Boston University School of Medicine," *Interfaces*, to appear.
- S. AhmadBeygi, A. Cohn, and M. Weir, "An Integer Programming Approach to Generating Airline Crew Pairings," *Computers and Operations Research*, 2009, Vol. 36, No. 4, pp. 1284 – 1298.
- S. Root and A. Cohn, "A Novel Modeling Approach for Express Package Carrier Planning," *Naval Research Logistics*, 2008 Vol. 55, No. 7, pp. 670 - 683.
- S. AhmadBeygi, A. Cohn, Y. Guan, and P. Belobaba, "Analysis of the Potential for Delay Propagation in Passenger Airline Networks," *Journal of Air Transport Management*, 2008, Vol. 14, No. 5, pp. 221 - 236.
- A. Cohn, M. Davey, L. Schkade, A. Siegel, and C. Wong, "Network Design and Flow Problems with Cross-Arc Costs," *European Journal of Operational Research*, 2008, Vol. 189, No. 3, pp. 890 - 901.
- S. Root, A. Cohn, A. Wang, and D. Mohr, "Integration of the Load Matching and Routing Problem with Equipment Balancing for Small Package Carriers," *Transportation Science*, 2007, Vol. 41, pp. 238 - 252.
- A. Cohn and C. Barnhart, "Composite-Variable Modeling for Service Parts Logistics," *Annals of Operations Research*, 2006, Vol. 144, No.1, pp. 17 - 32.
- C. Barnhart and A. Cohn, "Airline Schedule Planning: Accomplishments and Opportunities," *Manufacturing and Service Operations Management*, 2004, Vol. 6, No. 1, pp. 3 - 22.

Service: Professor Cohn has an outstanding service record within the University of Michigan as well as nationally and internationally in her professional activities. Her list of internal committee work speaks for itself. She is regularly sought out to participate on strategic committees at the department, college and university levels, e.g., Search Committee for IOE chair, CoE Commission on Undergraduate Education, CoE Strategic Planning Advisory Committee, and the University of Michigan Presidential Initiative for a Healthy Community for President Coleman. Professor Cohn was a founding member and subsequently a chair of the Alfred P. Sloan Foundation Industry Studies Program Early Career Development Committee. She also was an inaugural member of the Industry Studies Program Publications Group. She is a member of INFORMS Aviation Applications Section where she served as secretary/treasurer and vice-chair and is now chair. She has helped to develop a closer relationship between academic and industry professionals. Professor Cohn's participation in these groups has led to invitations to present her research to several major air carriers. As a result, one of her Ph.D. students spent the summer at Lufthansa, and Professor Cohn is now negotiating a long-term University research contract with the company. Professor Cohn also serves as associate editor of *OMEGA, The International Journal of Management Science*.

External Reviewers:

Reviewer A: "These modeling and hybrid algorithmic design capabilities allow Amy to *generate improved solutions* to problems that others have tried to address. Moreover, they allow her to define, formulate and *solve expanded problems* (those that integrate decisions to a greater extent) *that others have failed to solve* and whose solution Amy has shown to yield significant economic benefits. ... Already, her work is being used to schedule healthcare professionals and her work has led to shifts in the way that at least one airline evaluates its plans."

Reviewer B: "Her work has an impressive degree of both variety and depth. ... I honestly believe that Amy Cohn will be one of the OR superstars in the future."

Reviewer C: "...one of the strong professional attractions of the IOE department was the opportunity to work with Amy. ... If Michigan fails to grant her tenure, there are many other outstanding universities that would like to capitalize on such a mistake, including [my institution]."

Reviewer D: "I would summarize her main research contribution as a combination of innovative modeling and addressing the resulting computational challenges. ... I would say she distinguishes herself by the breadth of applications and by the sustained program to develop modeling and computational tools adapted and enhanced by the variety of applications."

Reviewer E: "Specifically, Dr. Cohn worked on an advanced scheduling and manufacturing execution system for Ford stamping operations and was able to deliver a system that has been implemented in production. ... Professor Cohn stands above the competition in her ability to easily grasp problem areas outside of her expertise, interact well with her industry partners, and deliver quantifiable results."

Reviewer F: "Amy is one of the top scholars [in her cohort] in the modeling and solution of (largely deterministic) integer programming problems that arise in a vast range of applications and operations. ... I have found the caliber of her research to be quite high. ... Her problems are computationally difficult Her algorithmic approach is rigorous, building on a theoretically sound mathematical formulation and using strategies that are drawn from those [embedded] in optimal algorithms."

Reviewer G: "I consider her recent work on robustness to be particularly important and it illustrates that she does indeed recognize and select important problems. ... One of the striking features of Professor Cohn's research has been her focus on real-world practical problems to motivate the development of models and solution methods particularly involving combinatorial optimization."

Reviewer H: "In summary, her choice of problems with domain significance is excellent, her command of the underlying methodology is sufficiently strong to be able to manipulate the methodology creatively to solve problems, and she seems to have a seasoned sense of what constitutes an industrially practical solution. ...I would definitely put her in the top three of applied researchers [of her cohort] who I know in IE/OR at highly ranked universities..."

Summary of Recommendation: Professor Cohn is a gifted researcher and inspiring teacher who contributes significant and meaningful service both internally and externally. Her research employs modeling and algorithmic development in novel and creative ways to couple applications-driven theory with implementation in a practical context. Her work is representative of the best kind of high-impact applied research across a variety of disciplines. She has been an outstanding mentor of numerous undergraduate and graduate students. It is with the support of the College of Engineering Executive Committee that I recommend Amy Cohn for promotion to associate professor of industrial and operations engineering, with tenure, Department of Industrial Operations and Engineering, College of Engineering.



David C. Munson, Jr.
Robert J. Vlasic Dean of Engineering
College of Engineering

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