

Curriculum Vita

Hrayer Aprahamian

Assistant Professor

Department of Industrial and Systems Engineering, Texas A&M University
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Education

Virginia Tech - Blacksburg, VA, United States *August 2014 - May 2018*

Ph.D. in Industrial and Systems Engineering

Major: Operations Research

Dissertation: Optimal Risk-based Pooled Testing in Public Health Screening, with Equity and Robustness Considerations

Advisors: Prof. Ebru Bish (co-chair), Prof. Douglas Bish (co-chair)

American University of Beirut - Beirut, Lebanon *August 2010 - August 2012*

M.S. in Engineering Management

Track: Financial Engineering

Dissertation: Pricing Asian Options via Compound Gamma and Orthogonal Polynomials

Advisor: Prof. Bacel Maddah

Lebanese University - Beirut, Lebanon *September 2007 - July 2010*

B.S. in Physics

Awarded certificate of excellence from the Dean of Faculty of Sciences

Ranked first among graduating class

All graduate education has been supported by scholarships and assistantships

Academic Positions

Assistant Professor *July 2018 - Present*

Industrial and Systems Engineering, Texas A&M University

Research Interests

My research interests lie at the interface of Operations Research and Machine Learning. Specifically, my research focuses on combinatorial/discrete optimization, and network analysis, in which I work on finding new solution techniques and efficient algorithmic approaches to solve difficult optimization problems. Applications of my work include high-dimensional cluster analysis, risk classification procedures, and large-scale screening of heterogeneous populations. I am particularly interested in applications related to healthcare systems and public policy decision-making.

Research Methodologies: Discrete/Combinatorial Optimization, Cluster Analysis, Network Analysis, Statistics.

Selected Honors and Awards

- Pritsker Doctoral Dissertation Award** 2019
First place for the dissertation:
Optimal Risk-based Pooled Testing in Public Health Screening, with Equity and Robustness Considerations.
- Young Distinguished Alumni Award** 2019
Department of Industrial Engineering and Management
American University of Beirut
- Pierskalla Award** 2017
Runner up for the paper:
H. Aprahamian, D. R. Bish, and E. K. Bish. Optimal risk-based group testing strategies, with equity considerations. *In press with Management Science*.
- Paul E. Torgersen Graduate Student Research Excellence Award** 2018
First place for the dissertation:
Optimal Risk-based Pooled Testing in Public Health Screening, with Equity and Robustness Considerations.
- Bonder Scholar for Applied Operations Research in Health Services** 2017
Finalist for the dissertation:
Optimal Risk-based Pooled Testing in Public Health Screening, with Equity and Robustness Considerations.
- John L. Pratt Graduate Fellowship** 2014
Awarded based on superior academic achievements and credentials
Virginia Tech, Department of Industrial and Systems Engineering
- Alexander E. Walter Graduate Fellowship** 2015
Awarded based on superior academic achievements and credentials
Virginia Tech, Department of Industrial and Systems Engineering
- John A. White Graduate Teaching Assistantship** 2017
Awarded based on superior academic achievements and credentials
Virginia Tech, Department of Industrial and Systems Engineering

Publications

1. **H. Aprahamian**, D. R. Bish, and E. K. Bish. Optimal risk-based group testing. *Management Science*, 2019.
2. **H. Aprahamian**, E. K. Bish, and D. R. Bish. Adaptive risk-based array pooling in public health screening. *IIE Transactions*, 2018.
3. **H. Aprahamian**, D. R. Bish, and E. K. Bish. Optimal Group Testing: Structural Properties and Robust Solutions, with Application to Public Health Screening. *Under third round of review with INFORMS Journal on Computing*.
4. **H. Aprahamian**, E. K. Bish, and D. R. Bish. Static Risk-based Group Testing Schemes under Imperfectly Observable Risk. *Under second round of review with Stochastic Systems*.
5. **H. Aprahamian**, D. R. Bish, and E. K. Bish. Residual risk and waste in donated blood with pooled nucleic acid testing. *Statistics in Medicine*, 35(28):5283-5301, 2016.

6. **H. Aprahamian**, B. Maddah. Pricing Asian options via compound gamma and orthogonal polynomials. *Applied Mathematics and Computation*, 264:21-43, 2015.
7. N. Nguyen, E. K. Bish, and **H. Aprahamian**. Sequential prevalence estimation with pooling and continuous test outcomes under limited resources. *Statistics in Medicine*, 37(15):2391-2426, 2018.
8. N. Nguyen, **H. Aprahamian**, E. K. Bish, D. R. Bish. A Methodology for Deriving the Sensitivity of Pooled HIV Testing, Based on Viral Load Progression and Pooling Dilution. *Journal of Translational Medicine*, 2010.

Working Papers / Submitted for Publication

1. **H. Aprahamian** and H. El-amine. Optimal Clustering of Frequency Data with Application to Disease Risk Categorization. *Submitted*.
2. **H. Aprahamian** and H. El-amine. Optimal Test Selection for the Screening of Heterogeneous Populations. *Submitted*.
3. **H. Aprahamian** and H. El-amine. A Class of Multivariate Set Partitioning Problems with an Application to Multiple Disease Screening of Heterogeneous Populations. *Working paper*.

Conference Presentations

1. **H. Aprahamian**, D. R. Bish, and E. K. Bish. Optimal Test Selection for the Screening of Heterogeneous Populations. *INFORMS Healthcare Conference*, Boston, MA, July 2019.
2. **H. Aprahamian**, D. R. Bish, and E. K. Bish. Optimal Group Testing: Structural Properties and Robust Solutions, with Application to Public Health Screening. *INFORMS Annual Meeting*, Phoenix, AZ, November 2018.
3. **H. Aprahamian**, D. R. Bish, and E. K. Bish. Optimal risk-based group testing. *INFORMS Annual Meeting*, Houston, TX, October 2017.
4. **H. Aprahamian**, D. R. Bish, and E. K. Bish. Optimal static risk-based group testing under imperfectly observable risk. *INFORMS Annual Meeting*, Houston, TX, October 2017.
5. **H. Aprahamian**, E. K. Bish, and D. R. Bish. Adaptive risk-based array pooling in public health screening. *INFORMS Annual Meeting*, Nashville, TN, November 2016.
6. **H. Aprahamian**, D. R. Bish, and E. K. Bish. Residual risk and waste in donated blood with pooled nucleic acid testing. *INFORMS Annual Meeting*, Philadelphia, PA, November 2015.
7. **H. Aprahamian**, D. R. Bish, and E. K. Bish. Modeling of residual risk and waste in donated blood with pooled nucleic acid testing and under the dilution effect. *INFORMS Healthcare Conference*, Nashville, TN, July 2015.

Research/Teaching Experience

Course Instructor

Texas A&M, Department of Industrial and Systems Engineering
 –ISEN 623 - Nonlinear and Dynamic Programming

Spring 2019

- Theory and numerical methods of nonlinear programming and dynamic programming. Topics covered in the course include optimality conditions (Lagrange and Karush-Kuhn-Tucker (KKT) conditions), algorithms for unconstrained and constrained optimization, and an introduction to deterministic DP.

–ISEN 320 - Operations Research I *Fall 2018*

- The course covers the fundamentals of linear programming , including formulation; simplex method; big-M and two-Phase simplex methods; duality and sensitivity analysis; transportation, transshipment, and assignment problems; and network models.

Virginia Tech, Department of Industrial and Systems Engineering

–ISE 3424 - Deterministic Operations Research II *Summer 2016*

- Received an excellent score from students in teaching evaluations (a score of 91/100 on “overall teaching effectiveness”)
- The course covers the fundamentals of Operations Research modeling and analysis, including complexity theory, integer programming, nonlinear programming, and dynamic programming

Research Assistant

Virginia Tech, Department of Industrial and Systems Engineering *2014 - Present*
 Supported by the National Science Foundation
 American University of Beirut, Engineering Management Program *2010 - 2012*
 Supported by Qatar Foundation

Part Time Research Assistant

American University of Beirut, Engineering Management Program *2012 - 2013*
 American University of Beirut Medical Center *2013 - 2014*

Teaching Assistant

Virginia Tech, Department of Industrial and Systems Engineering *2010 - Present*
 American University of Beirut, Engineering Management Program

Courses (G denotes a graduate level course):

- ISE 5406 (G) – Optimization I
- ISE 5984 (G) – Supply Chain and Operations Engineering
- ISE 5034 (G) – Math Probability and Statistics for ISE’s
- ISE 4424 – Logistics Engineering
- ISE 3424 – Discrete-Event Simulation
- ISE 2404 – Deterministic Operations Research I
- ISE 2214 – Manufacturing Processes Lab
- INDE 301 – Engineering Economy
- ENMG 500 – Engineering Management I
- ENMG 501– Engineering Management II

Taught review sessions, assisted students, held office hours, and graded student work.

Development Activities

INFORMS Doctoral Student Colloquium *November 2016*
 Nashville, TN

Grant Proposal Writing

Assisted my Ph.D. advisors in writing two grant proposals, to the National Institutes of Health (NIH) and the National Science Foundation (NSF)

GTA Training Workshop

August 2014

Virginia Tech

Three-day workshop on teaching, communication, and interpersonal skills

Professional Organizations

Institute for Operations Research and Management Sciences (INFORMS)

Health Applications Society, member

Decision Analysis Society, member

Manufacturing and Service Operations Management Society, member

Virginia Tech INFORMS Student Chapter, Vice President

2016- 2017

Virginia Tech INFORMS Student Chapter, Chief Financial Officer

2016- 2017

Institute of Industrial and Systems Engineers (IISE)

Virginia Tech IISE Student Chapter, member

Industrial Experience

Financial Test Analyst

August 2012 - July 2014

Murex Software S.A.S, Beirut Lebanon

- Worked with the Interest Rate Derivatives (IRD) module so as to ensure high quality control standards for major IRD developments including, verification and validation testing, devising of testing strategies, implementation and monitoring.
- Provided consulting on issues requiring IRD expertise, and was assigned the role of “Test Lead” for a multi-million dollar project; which involved designing, implementing, and managing a testing scheme (automated and manual). This played a crucial role in a smooth and successful software rollout to the client.

Computer Skills

Programming Languages

C++, VBA, SQL, Matlab, Python.

Optimization and Simulation Packages

LINGO, AMPL, Excel Solver, Arena, Simio.

Other Software Packages

MathCAD, Expert Fit, L^AT_EX, and standard office packages: Microsoft Office.