Austin Buchanan

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AFFILIATION

2021–Present Associate Professor, Industrial Engineering & Management
Oklahoma State University, Stillwater, OK

2015–2021 Assistant Professor, Industrial Engineering & Management
Oklahoma State University, Stillwater, OK

EDUCATION

2011–2015 Doctor of Philosophy, Industrial and Systems Engineering
Texas A&M University, College Station, TX

2007–2011 Bachelor of Science, Industrial Engineering & Management
Oklahoma State University, Stillwater, OK

PUBLICATIONS

Refereed Journal Articles

1. J. Zhang, H. Validi, A. Buchanan, I.V. Hicks. Linear-size formulations for connected planar graph partitioning and political districting. To appear, *Optimization Letters*.
2. Y. Lu, H. Salemi, B. Balasundaram, A. Buchanan. On fault-tolerant low-diameter clusters in graphs. *INFORMS Journal on Computing*, 34(6): 3181–3199, 2022.
3. H. Validi, A. Buchanan. Political districting to minimize cut edges. *Mathematical Programming Computation*, 14, 623–672, 2022.
4. M.J. Naderi, A. Buchanan, J.L. Walteros. Worst-case analysis of clique MIPs. *Mathematical Programming*, 195: 517–551, 2022.
5. H. Salemi, A. Buchanan. Solving the distance-based critical node problem. *INFORMS Journal on Computing*, 34(3): 1309–1326, 2022.
6. H. Validi, A. Buchanan, E. Lykhovyd. Imposing contiguity constraints in political districting models. *Operations Research*, 70(2): 867–892, 2022.
7. V. Stozhkov, A. Buchanan, S. Butenko, V. Boginski. Continuous cubic formulations for cluster detection problems in networks. *Mathematical Programming*, 196: 279–307, 2022.
8. B. Farmanesh, A. Pourhabib, B. Balasundaram, A. Buchanan. A Bayesian framework for local calibration of expensive computational models through non-isometric matching. *IISE Transactions*, 53(3): 352–364, 2021.
9. H. Validi, A. Buchanan. The optimal design of low-latency virtual backbones. *INFORMS Journal on Computing*, 32(4): 952–967, 2020.
10. J.L. Walteros, A. Buchanan. Why is maximum clique often easy in practice? *Operations Research*, 68(6): 1866–1895, 2020.
11. H. Salemi, A. Buchanan. Parsimonious formulations for low-diameter clusters. *Mathematical Programming Computation*, 12(3): 493–528, 2020.
12. H. Validi, A. Buchanan. A Note on "A linear-size zero-one programming model for the minimum spanning tree problem in planar graphs". *Networks*, 73(1): 135–142, 2019.

13. A. Buchanan, Y. Wang, S. Butenko. Algorithms for node-weighted Steiner tree and maximum-weight connected subgraph. *Networks*, 72(2): 238–248, 2018.
14. Y. Wang, A. Buchanan, S. Butenko. On imposing connectivity constraints in integer programs. *Mathematical Programming*, 166(1): 241–271, 2017.
15. A. Buchanan. Extended formulations for vertex cover. *Operations Research Letters*, 44(3): 374–378, 2016.
16. S. Kahruman-Anderoglu, A. Buchanan, S. Butenko, O.A. Prokopyev. On provably best construction heuristics for hard combinatorial optimization problems. *Networks*, 67(3): 238–245, 2016.
17. A. Buchanan, J.S. Sung, S. Butenko, E.L. Pasiliao. An integer programming approach for fault-tolerant connected dominating sets. *INFORMS Journal on Computing*, 27(1):178-188, 2015.
18. A. Verma, A. Buchanan, S. Butenko. Solving the maximum clique and vertex coloring problems on very large sparse networks. *INFORMS Journal on Computing*, 27(1):164-177, 2015.
19. A. Buchanan, J.S. Sung, V. Boginski, S. Butenko. On connected dominating sets of restricted diameter. *European Journal of Operational Research*, 236(2):410-418, 2014.
20. A. Buchanan, J.L. Walteros, S. Butenko, P.M. Pardalos. Solving maximum clique in sparse graphs: an $O(nm + n2^{d/4})$ algorithm for d-degenerate graphs. *Optimization Letters*, 8(5):1611-1617, 2014.

SUBMITTED PAPERS AND BOOK CHAPTERS

21. P. Belotti, A. Buchanan, S. Ezazipour. Political districting to optimize the Polsby-Popper compactness score. Submitted in May 2023.
22. M. Shahmizad, A. Buchanan. Political districting to minimize county splits. Revision submitted to *Operations Research*, July 2023.

OTHER

23. A. Buchanan. Political districting. In Encylopedia of Optimization (3rd edition). Ed. by P.M. Pardalos and O.A. Prokopyev. Springer, 2023.
24. A. Buchanan. New congressional districts for Alabama: SCOTUS rules on race v. geography. *Montgomery Advertiser*, June 19, 2023. (Link1) (Link2)
25. A. Buchanan, M.J. Naderi. A brief tutorial on Gomory cuts. *IFORS News*, pages 7-9, March 2020.
26. A. Buchanan, S. Butenko. Tight extended formulations for independent set. Unpublished, 2015.
27. A. Buchanan, N. Chen, X. Ma. Using GRASP for the cover by s-defective independent sets problem. In *Examining Robustness and Vulnerability of Critical Infrastructure Networks*. Ed. by S. Butenko, E.L. Pasiliao, and V. Shylo. Amsterdam: IOS Press, 2014, pp. 17–25.

GRANTS (Total: $1.17 million)

- A. Buchanan (PI). "CAREER: Parsimonious Models for Redistricting," *National Science Foundation* (CMMI-1942065), $508,000, 6/1/2020–5/31/2025.
- B. Balasundaram (PI), A. Buchanan (coPI), and S. Heragu (coPI). "FLAT: Freight Lane Assignment Tool," *TreeHouse Foods Inc*, $163,730, 1/13/2020–1/16/2021.
- A. Buchanan (PI). "Imposing Connectivity Constraints in Large-Scale Network Problems," *National Science Foundation* (CMMI-1662757), $258,586, 6/15/2017–5/31/2021.
- B. Balasundaram (PI), A. Buchanan (coPI), and S. Heragu (coPI). "Optimization-Based Aggregate Master Planning Tools for Bay Valley Foods, LLC," *Bay Valley Foods, LLC*, $250,599, 10/1/2017–1/31/2020.

SELECTED AWARDS AND HONORS

- Harvey J Greenberg Research Award, INFORMS Computing Society, for the paper "Imposing contiguity constraints in political districting models" coauthored with Hamidreza Validi and Eugene Lykhovyd, 2021.

- ◇ IEM Faculty Award, for "sustained and significant contributions in the areas of teaching and service in the School of Industrial Engineering and Management," 2021.
- ◇ Honorable Mention, INFORMS JFIG Paper Competition, for the paper "Why is maximum clique often easy in practice?" coauthored with Jose L. Walteros, 2019.
- ◇ Santa Gift Matching Challenge, 3rd place ($1,000 prize), Kaggle, 2018.
- ◇ Invited Speaker for Workshop on Mixed Integer Programming MIP 2017 at HEC Montréal.
- ◇ The paper "Solving the maximum clique and vertex coloring problems on very large sparse networks" was selected by INFORMS President L. Robin Keller as the May 2015 President's Pick Article.
- ◇ National Merit Scholar, National Merit Scholarship Corporation, 2007. (Accepted College-Sponsored Merit Scholarship Award from OSU, 2007–2011.)

TEACHING

- ◇ Graduate
  - Integer and Combinatorial Optimization, University of Pavia, Italy (Summer 2022)
  - IEM 6053, Integer and Combinatorial Optimization (F22, S20, F18, S17, F16)
  - IEM 5203, Facility Location, Warehousing, and Transportation (S22)
  - IEM 5063, Network Flows and Combinatorial Optimization (S16)
- ◇ Undergraduate
  - IEM 4203, Facilities and Material Handling System Design (F23, F22, F21, F20, F19, F18, F17)
  - IEM 4013, Introduction to Operations Research (F23, S23, S22, S21, S20, S18, F15)
  - IEM 3503, Engineering Economic Analysis (S21, S19, S18)
  - ISEN 302 (at TAMU), Engineering Economy (S15, F14, S14)

STUDENTS

- ◇ Doctoral Students
  - Xiaocong Zhen, Fall 2023 – present.
  - Soraya Ezazipour, Fall 2021 – present.
  - Maral Shahmizad, Summer 2021 – present.
  - Mohammad Javad Naderi, Fall 2017 – Fall 2021. Current: OR Scientist at Delta Air Lines.
  - Hosseinali Salemi, Fall 2016 – Summer 2020. Current: OR Scientist at FedEx Freight.
  - Hamidreza Validi, Fall 2016 – Summer 2020. Current: Assistant Professor, Texas Tech University.
- ◇ Undergraduate Students
  - Grace Hendrix, IEM URA (Fall 2023)
  - Ryne Garrison, NSF REU (Summer 2021).
  - Elizabeth Bunting, NSF REU (Summer 2018) & Wentz Researcher (Fall 2018 – Spring 2019).

PROFESSIONAL SERVICE

EDITORIAL SERVICE

- ◇ Associate Editor, *Networks*, 2016–present.
- ◇ Associate Editor, *Optimization Letters*, 2019–present.
- ◇ Referee: *Operations Research, Mathematical Programming, Management Science, INFORMS Journal on Computing, INFORMS Journal on Optimization, Manufacturing & Service Operations Management, SIAM Journal on Optimization, Election Law Journal, Networks, European Journal of Operational Research, Discrete Optimization, Discrete & Computational Geometry, Algorithmica, Electronic Journal of Combinatorics, IIE Transactions, Naval Research Logistics, Optimization Letters, Journal of Global Optimization, Journal of Combinatorial Optimization, ESA 2023, ALENEX21, FAW 2015*.

CONFERENCES

- ◇ Cluster Chair, *Network Applications*: ICS 2022.
- ◇ Cluster Chair, *Telecommunications & Network Analytics*: INFORMS (2021, 2020, 2019).
- ◇ Cluster Chair, *Network Optimization*: IOS 2018, INFORMS (2017, 2016).
- ◇ Session Chair: INFORMS (2021, 2019, 2017, 2014), IOS 2018, ISMP 2015.

OTHER PROFESSIONAL SERVICE

- ◇ NSF proposal review panelist.
- ◇ Committee Member, INFORMS Computing Society Student Paper Prize, 2023.
- ◇ Member of Council, INFORMS Section on Telecommunications and Network Analytics, 2018–2022.
- ◇ Representative of INFORMS Optimization Society, INFORMS Subdivisions Council, 2017–2018.
- ◇ Judge, INFORMS George Nicholson Student Paper Competition, 2017.
- ◇ Vice Chair for Network Optimization, INFORMS Optimization Society, 2015–2017.

INVITED RESEARCH SEMINARS

- ◇ Georgia Tech (online)
- ◇ Oklahoma State University
- ◇ Texas A&M University
- ◇ Tufts University (MGGG Redistricting Lab, online)
- ◇ University of Illinois Urbana-Champaign (online)
- ◇ University of Oklahoma
- ◇ University of Pavia (Italy)
- ◇ University of Pittsburgh
- ◇ Virginia Tech