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

21. A. Buchanan, S. Ezazipour, M. Shahmizad. A widespread belief about county splits in political districting plans is wrong. Submitted in December 2023.

22. P. Belotti, A. Buchanan, S. Ezazipour. Political districting to optimize the Polsby-Popper compactness score. Submitted in May 2023.

23. M. Shahmizad, A. Buchanan. Political districting to minimize county splits. Revision submitted to *Operations Research*, July 2023.

OTHER

24. A. Buchanan. Using optimization to support minority representation in Voting Rights Act cases. *ORMS Today*, 50(4), 2023.

25. A. Buchanan. A brief tutorial on Benders decomposition. To appear, *IFORS News*.

26. A. Buchanan. Political districting. In Encylopedia of Optimization (3rd edition). Ed. by P.M. Pardalos and O.A. Prokopyev. Springer, 2023.

27. A. Buchanan. New congressional districts for Alabama: SCOTUS rules on race v. geography. *Montgomery Advertiser*, June 19, 2023. (Link1) (Link2)

28. A. Buchanan, M.J. Naderi. A brief tutorial on Gomory cuts. *IFORS News*, pages 7-9, March 2020.

29. A. Buchanan, S. Butenko. Tight extended formulations for independent set. Unpublished, 2015.

30. 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

⋄ Honorable Mention Best Poster, IPCO 2023, for the poster "Political districting to minimize county splits" presented by coauthor Maral Shahmizad, 2023.

⋄ 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) and CEAT URS (Fall 2023 – Spring 2024).
- Ryne Garrison, NSF REU (Summer 2021).
- Elizabeth Bunting, NSF REU (Summer 2018) and 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

◇ Southern Methodist 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