

# Sepehr Hajebi

Curriculum Vitæ (updated on November 27, 2023)

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| Contact            | <ul style="list-style-type: none"><li>✉ <a href="mailto:shajebi@uwaterloo.ca">shajebi@uwaterloo.ca</a> (current)</li><li>✉ <a href="mailto:sepehr.hajebi@gmail.com">sepehr.hajebi@gmail.com</a> (personal)</li><li>🌐 <a href="http://sepehrhajebi.com">sepehrhajebi.com</a></li></ul>  |
| Education          | <p><b>PhD in Mathematics (Combinatorics and Optimization)</b><br/>University of Waterloo, Waterloo, Ontario, Canada<br/>Fall 2020 – (expect to graduate in Spring 2024)<br/><i>Thesis:</i> Dichotomy theorems for treewidth and induced subgraphs<br/><i>Advisor:</i> <a href="#">Sophie Spirkl</a></p> <p><b>BSc and MSc in Mathematics</b><br/>Isfahan University of Technology, Isfahan, Iran<br/>Fall 2012 – Spring 2019</p>   |
| Awards             | <ol style="list-style-type: none"><li>7. <b>Sinclair Graduate Scholarship</b>, 1900+<math>\epsilon</math> CAD<br/>Department of Combinatorics and Optimization, University of Waterloo<br/>(Fall 2023)</li><li>6. <b>Outstanding TA Award</b><br/>Department of Combinatorics and Optimization, University of Waterloo<br/>(Winter 2022)</li><li>5. <b>Visiting Korean Mathematical Society (KMS), Korea Institute for Advanced Studies (KIAS), and National Institute for Mathematical Sciences (NIMS)</b><br/>Invited and funded by The Embassy of South Korea in Iran (Fall 2016)</li><li>4. <b>Korean Mathematical Society Contest for University Students</b><br/>Seoul, South Korea – Third Prize (Fall 2016)</li><li>3. <b>International Mathematics Competition for University Students (IMC)</b><br/>Blagoevgrad, Bulgaria – Third Prize (Spring 2015 and 2016)</li><li>2. <b>Iranian Mathematical Society Competition for University Students</b><br/>Second and Third Prize (Spring 2015 and 2016)</li><li>1. <b>IUT Elite Student Award</b><br/>Isfahan University of Technology (2016 and 2018)</li></ol> |
| Research Interests | <p><b>Broadly:</b> Discrete math, especially structural, extremal and algorithmic graph theory, and combinatorial optimization</p> <p><b>Currently:</b> Induced subgraphs, graph minor theory, and their interconnection.</p>  |
| Papers             | <p>All manuscripts available at <a href="http://arxiv.org/a/hajebi_s_1">http://arxiv.org/a/hajebi_s_1</a>.</p> <p><i>Published:</i></p> <ol style="list-style-type: none"><li>23. <b>Induced subgraphs and tree decompositions</b><br/><b>VII. Basic obstructions in <math>H</math>-free graphs</b><br/><a href="#">J. Comb. Theory Ser. B 164 (2024)</a><br/>with T. Abrishamin, B. Alecu, M. Chudnovsky and S. Spirkl.</li></ol>   |

22. **Induced subgraphs and tree decompositions**  
**II. Toward walls and their line graphs in graphs of bounded degree**  
[\*J. Comb. Theory Ser. B\* 164 \(2024\)](#)  
 with T. Abrishami, M. Chudnovsky, C. Dibek, P. Rzażewski, S. Spirkl and K. Vušković.
  21. **Induced subgraphs and tree decompositions**  
**V. One neighbor in a hole**  
[\*J. Graph Theory\* \(2023\)](#)  
 with T. Abrishami, B. Alecu, M. Chudnovsky, S. Spirkl and K. Vušković.
  20. **Induced subgraphs and tree decompositions**  
**IV. (Even hole, diamond, pyramid)-free graphs**  
[\*Electron. J. Comb\* 30\(2\) \(2023\)](#)  
 with T. Abrishami, M. Chudnovsky and S. Spirkl.
  19. **Induced subgraphs and tree decompositions**  
**III. Three-path-configurations and logarithmic treewidth**  
[\*Advances in Combinatorics\* \(6\) \(2022\)](#)  
 with T. Abrishami, M. Chudnovsky and S. Spirkl.
  18. **Complexity dichotomy for List-5-Coloring with a forbidden induced subgraph**  
[\*SIAM J. Discrete Math\* 256\(6\) \(2022\)](#)  
 with Y. Li and S. Spirkl.
  17. **Minimal induced subgraphs of two classes of 2-connected non-Hamiltonian graphs**  
[\*Discrete Math.\* 345\(7\) \(2022\)](#)  
 with J. Cheriyan, Z. Qu and S. Spirkl.
  16. **Edge clique cover of claw-free graphs**  
[\*J. Graph Theory\* 90\(3\) \(2019\)](#)  
 with R. Javadi.
- Accepted or in revision:*
15. **Hitting all maximum stable sets in  $P_5$ -free graphs**  
[\*J. Comb. Theory Ser. B\* \(accepted\)](#)  
 with Y. Li and S. Spirkl (2023)
  14. **List-3-Coloring ordered graphs with a forbidden induced subgraph**  
[\*SIAM J. Discrete Math\* \(accepted\)](#)  
 with Y. Li and S. Spirkl (2023)
  13. **Induced subgraphs and tree decompositions**  
**VIII. Excluding a forest in (theta, prism)-free graphs**  
[\*Combinatorica\* \(in revision\)](#)  
 with T. Abrishami, B. Alecu, M. Chudnovsky and S. Spirkl (2023)
- Submitted:*
12. **List- $k$ -Coloring  $H$ -free graphs for all  $k > 4$**   
 with M. Chudnovsky and S. Spirkl (2023)
  11. **Induced subgraphs and tree decompositions**  
**XIV. Non-adjacent neighbors in a hole**  
 with M. Chudnovsky and S. Spirkl (2023)
  10. **Induced subgraphs and tree decompositions**  
**XIII. Basic obstruction in  $\mathcal{H}$ -free graphs for finite  $\mathcal{H}$**   
 with B. Alecu, M. Chudnovsky and S. Spirkl (2023)
  9. **Induced subgraphs and tree decompositions**  
**XII. Grid Theorem for pinched graphs**  
 with B. Alecu, M. Chudnovsky and S. Spirkl (2023)

8. **Induced subgraphs and tree decompositions**  
**XI. Local structure for even-hole-free graphs of large treewidth**  
with B. Alecu, M. Chudnovsky and S. Spirkl (2023)
7. **Induced subdivisions with pinned branch vertices**  
solo paper (2023)
6. **Induced subgraphs and tree decompositions**  
**X. Towards logarithmic treewidth for even-hole-free graphs**  
with T. Abrishami, B. Alecu, M. Chudnovsky and S. Spirkl (2023)
5. **Tree independence number for (even hole, diamond, pyramid)-free graphs**  
with T. Abrishami, B. Alecu, M. Chudnovsky, S. Spirkl and K. Vušković (2023)
4. **Induced subgraphs and tree decompositions**  
**IX. Grid theorem for perforated graphs**  
with B. Alecu, M. Chudnovsky and S. Spirkl (2023)
3. **Induced subgraphs and tree decompositions**  
**VI. Graphs with 2-cutsets**  
with T. Abrishamin, B. Alecu, M. Chudnovsky and S. Spirkl (2022)

*Upcoming:*

2. **Chordal graphs, even-hole-free graphs and sparse obstructions to bounded treewidth**  
solo paper.
1. **Certification for  $H$ -free graphs and beyond.**  
with Nicolas Bousquest, Aristotelis Chaniotis, Linda Cook, S. Spirkl, Pieron Théo and Sébastien Zeitoun.

## Talks

*Upcoming:*

7. **Treewidth, Erdős-Posá and induced subgraphs** [invited]  
New York Combinatorics Seminar  
(Feb 23, 2024)

*Past:*

6. **Several Gyárfás-Sumner-type results for treewidth** [invited]  
Graphs and Matroids Seminar, University of Waterloo, Canada  
(Nov 23, 2023)
5. **Hitting all maximum stable sets in  $P_5$ -free graphs** [invited]  
Graphs and Matroids Seminar, University of Waterloo, Canada  
(Feb 6, 2023)
4. **Forests in even-hole-free graphs of large treewidth** [invited]  
Barbados Graph Theory Workshop, Bellairs Research Institute of McGill University, Barbados  
(Dec 12, 2022)
3. **Holes, hubs, and bounded treewidth** [invited]  
IBS Virtual Discrete Math Colloquium, Daejeon, South Korea  
(July 7, 2022)
2. **Bounded treewidth in hereditary graph classes** [invited]  
Graphs and Matroids Seminar, University of Waterloo, Canada  
(July 5, 2022)
1. **Bounded treewidth in hereditary graph classes** [invited]  
Seymour is 70, ENS de Lyon, France  
(June 22, 2022)

**Mentoring  
Teaching  
Service**

*Undergraduate mentorship at University of Waterloo:*

**Directed Reading Program (DRP)**

Women in Math (WiM) committee (Fall 2023)

*Project:* Introduction to graph minor theory

*Mentees:* Xinyue Fan and Lyncy Li

**Undergraduate Research Assistant Program (URA)**

Department of Combinatorics and Optimization (Spring 2023)

*Project:* Maximum transitive set in  $H$ -free tournaments

*Mentee:* Yun Xing

*TA at University of Waterloo:*

22. **CO456 Game theory**, instructed by Martin Pei (Fall 2023)
21. **CO250 Introduction to optimization**, instructed by Jane Gao, David Jao and Walaa Morsi (Fall 2023)
20. **CO342 Graph Theory**, instructed by Peter Nelson (Spring 2023)
19. **MATH138 Calculus II for honors of mathematics**, various instructors (Winter 2023)
18. **CO250 Introduction to optimization**, instructed by Henry Wolkowicz, Jorn van der Pol, David Aleman Espinosa, Martin Pei (Winter 2023)
17. **MATH600 Mathematical software**, instructed by Sarah Chan (Fall 2022)
16. **CO456 Game theory**, instructed by David Jao (Fall 2022)
15. **CO380 Mathematical discovery and invention**, instructed by Logan Crew (Spring 2022)
14. **MATH239 Introduction to combinatorics**, instructed by Jane Gao, Debbie Leung and Kanstantsin Pashkovich (Winter 2022)
13. **CO255 Advanced optimization**, instructed by Bill Cook (Winter 2022)
12. **CO250 Introduction to optimization**, instructed by Levent Tuncel and Kanstantin Pashkovich (Fall 2021)
11. **CO450/650 Graph theory (graduate)**, instructed by Luke Postle (Fall 2021)
10. **CO351 Network-flow theory**, instructed by Joseph Cheriyan (Spring 2021)

*TA at Isfahan University of Technology:*

9. **Computational complexity (graduate)**, instructed by Ramin Javadi (2019).
8. **Elements of matrices and linear algebra**, instructed by Ramin Javadi (2018).
7. **Applied Linear algebra for engineering**, instructed by Ramin Javadi (2018).
6. **Graph theory (graduate)**, instructed by Ramin Javadi (2017).
5. **Elements of combinatorics**, instructed by Ramin Javadi (2017)
4. **Graph theory**, instructed by Behnaz Omoomi (2016).
3. **Elements of combinatorics**, instructed by Gholamreza Omid (2016).
2. **Graph theory (graduate)**, instructed by Behnaz Omoomi (2014)
1. **Elements of combinatorics**, instructed by Ramin Javadi (2014)

*Refereeing for journals and conference proceedings:*

- International Mathematics Research Notices (IMRN)
- J. Comb. Theory Ser. B (JCTB)
- European Journal of Combinatorics
- J. Graph Theory (JGT)
- Electronic Journal of Combinatorics
- European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB)
- Workshop on Graphs (WG)