

# Sepehr Hajebi

Curriculum Vitæ (updated on October 15, 2023)

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| <b>Education</b>          | <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><br><br><b>BSc and MSc in Mathematics</b><br>Isfahan University of Technology, Isfahan, Iran<br>Fall 2012 – Spring 2019  |
| <b>Awards</b>             | <ol style="list-style-type: none"><li>1. <b>Sinclair Graduate Scholarship</b>, 1900 CAD<br/>Department of Combinatorics and Optimization, University of Waterloo<br/>(Fall 2023)</li><li>2. <b>Outstanding TA Award</b><br/>Department of Combinatorics and Optimization, University of Waterloo<br/>(Winter 2022)</li><li>3. <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>5. <b>International Mathematics Competition for University Students (IMC)</b><br/>Blagoevgrad, Bulgaria – Third Prize (Spring 2015 and 2016)</li><li>6. <b>Iranian Mathematical Society Competition for University Students</b><br/>Second and Third Prize (Spring 2015 and 2016)</li><li>7. <b>IUT Elite Student Award</b><br/>Isfahan University of Technology (2016 and 2018)</li></ol> |
| <b>Research Interests</b> | <b>Broadly:</b> Discrete math, especially structural, extremal and algorithmic graph theory, and combinatorial optimization<br><b>Currently:</b> Induced subgraphs, graph minor theory, and their interconnection.   |
| <b>Papers</b>             | All manuscripts available at <a href="http://arxiv.org/a/hajebi_s_1">http://arxiv.org/a/hajebi_s_1</a> .<br><br><i>Accepted or in revision:</i> <ol style="list-style-type: none"><li>1. <b>Induced subgraphs and tree decompositions</b><br/><b>VII. Basic obstructions in <math>H</math>-free graphs</b><br/><i>J. Comb. Theory Ser. B</i> (accepted with minor revisions)<br/>with Tara Abrishamin, Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)</li></ol>   |

2. **Induced subgraphs and tree decompositions**  
**VIII. Excluding a forest in (theta, prism)-free graphs**  
*Combinatorica* (in revision)  
with Tara Abrishami, Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)
  3. **Induced subgraphs and tree decompositions**  
**II. Toward walls and their line graphs in graphs of bounded degree**  
*J. Comb. Theory Ser. B* (accepted)  
with Tara Abrishami, Maria Chudnovsky, Cemil Dibek, Paweł Rzażewski, Sophie Spirkl and Kristina Vušković (2021)
  4. **Induced subgraphs and tree decompositions**  
**V. One neighbor in a hole**  
*J. Graph Theory* (accepted)  
with Tara Abrishami, Bogdan Alecu, Maria Chudnovsky, Sophie Spirkl and Kristina Vuskovic (2022)
  5. **Hitting all maximum stable sets in  $P_5$ -free graphs**  
*J. Comb. Theory Ser. B* (in revision)  
with Yanjia Li and Sophie Spirkl (2023)
  6. **List-3-Coloring ordered graphs with a forbidden induced subgraph**  
*SIAM J. Discrete Math* (in revision)  
with Yanjia Li and Sophie Spirkl (2023)
- Published:*
7. **Induced subgraphs and tree decompositions**  
**IV. (Even hole, diamond, pyramid)-free graphs**  
[\*Electron. J. Comb\* 30\(2\)](#)  
with Tara Abrishami, Maria Chudnovsky and Sophie Spirkl (2023)
  8. **Induced subgraphs and tree decompositions**  
**III. Three-path-configurations and logarithmic treewidth**  
[\*Advances in Combinatorics\* \(6\)](#)  
with Tara Abrishami, Maria Chudnovsky and Sophie Spirkl (2022)
  9. **Complexity dichotomy for List-5-Coloring with a forbidden induced subgraph**  
[\*SIAM J. Discrete Math\* 256\(6\)](#)  
with Yanjia Li and Sophie Spirkl (2022)
  10. **Minimal induced subgraphs of two classes of 2-connected non-Hamiltonian graphs**  
[\*Discrete Math.\* 345\(7\)](#)  
with Joseph Cheriyian, Zishen Qu and Sophie Spirkl (2022)
  11. **Edge clique cover of claw-free graphs**  
[\*J. Graph Theory\* 90\(3\)](#)  
with Ramin Javadi (2019)
- Submitted:*
12. **Induced subgraphs and tree decompositions**  
**XII. Grid Theorem for pinched graphs**  
with Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)
  13. **Induced subgraphs and tree decompositions**  
**XI. Local structure for even-hole-free graphs of large treewidth**  
with Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)
  14. **Induced subdivisions with pinned branch vertices** (2023)

15. **Induced subgraphs and tree decompositions**  
**X. Towards logarithmic treewidth for even-hole-free graphs**  
with Tara Abrishami, Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)
  16. **Tree independence number for (even hole, diamond, pyramid)-free graphs**  
with Tara Abrishami, Bogdan Alecu, Maria Chudnovsky, Sophie Spirkl and Kristina Vušković (2023)
  17. **Induced subgraphs and tree decompositions**  
**IX. Grid theorem for perforated graphs**  
with Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)
  18. **Induced subgraphs and tree decompositions**  
**VI. Graphs with 2-cutsets**  
with Tara Abrishamin, Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2022)
- In preparation:*
19. **Induced subgraphs and tree decompositions**  
**XIII. Basic obstruction in  $\mathcal{H}$ -free graphs for finite  $\mathcal{H}$**   
with Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl.
  20. **Induced subgraphs and tree decompositions**  
**XIV. Two neighbors in a hole**  
with Maria Chudnovsky and Sophie Spirkl.
  21. **Chordal induced subgraphs in even-hole-free graphs with large treewidth.**
  22. **List- $k$ -Coloring  $H$ -free graphs for all  $k \geq 5$**   
with Maria Chudnovsky and Sophie Spirkl
  23. **Proof labelling schemes for forbidden induced subgraphs**  
with Aristotelis Chaniotis, Linda Cook and Sophie Spirkl

## Talks

*Upcoming:*

1. **Treewidth, Erdős-Posá and induced subgraphs** [invited]  
New York Combinatorics Seminar (Dec 8, 2023)
2. **Several Gyárfás-Sumner-type results for treewidth** [invited]  
Graphs and Matroids Seminar, University of Waterloo, Canada (Nov 23, 2023)

*Past:*

3. **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)
5. **Holes, hubs, and bounded treewidth** [invited]  
IBS Virtual Discrete Math Colloquium, Daejeon, South Korea (July 7, 2022)
6. **Bounded treewidth in hereditary graph classes** [invited]  
Graphs and Matroids Seminar, University of Waterloo, Canada (July 5, 2022)

7. **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:*

1. **Directed Reading Program (DRP)**  
Wemon in Math (WiM) committee (Fall 2023)  
*Project:* Introduction to graph minor theory  
*Mentees:* Xinyue Fan and Lyncy Li
2. **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:*

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

*TA at Isfahan University of Technology:*

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

8. **Graph theory (graduate)**, instructed by Behnaz Omoomi (2014)
9. **Elements of combinatorics**, instructed by Ramin Javadi (2014)

*Refereeing for journals and conference proceedings:*

1. International Mathematics Research Notices (IMRN)
2. J. Comb. Theory Ser. B (JCTB)
3. European Journal of Combinatorics
4. J. Graph Theory (JGT)
5. Electronic Journal of Combinatorics
6. European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB)
7. Workshop on Graphs (WG)