

# Sepehr Hajebi

Curriculum Vitæ (updated on November 2, 2023)

---

<b>Contact</b>	<a href="mailto:shajebi@uwaterloo.ca">✉ shajebi@uwaterloo.ca</a> (current) <a href="mailto:sepehr.hajebi@gmail.com">✉ sepehr.hajebi@gmail.com</a> (personal) <a href="https://sepehrhajebi.com">🌐 sepehrhajebi.com</a>
<b>Education</b>	<b>PhD in Mathematics (Combinatorics and Optimization)</b> University of Waterloo, Waterloo, Ontario, Canada Fall 2020 – (expect to graduate in Spring 2024) <i>Thesis:</i> Dichotomy theorems for treewidth and induced subgraphs <i>Advisor:</i> <a href="#">Sophie Spirkl</a>  <b>BSc and MSc in Mathematics</b> Isfahan University of Technology, Isfahan, Iran Fall 2012 – Spring 2019
<b>Awards</b>	<ol style="list-style-type: none"><li>7. <b>Sinclair Graduate Scholarship</b>, 1900+<math>\epsilon</math> CAD Department of Combinatorics and Optimization, University of Waterloo (Fall 2023)</li><li>6. <b>Outstanding TA Award</b> Department of Combinatorics and Optimization, University of Waterloo (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> 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> Seoul, South Korea – Third Prize (Fall 2016)</li><li>3. <b>International Mathematics Competition for University Students (IMC)</b> Blagoevgrad, Bulgaria – Third Prize (Spring 2015 and 2016)</li><li>2. <b>Iranian Mathematical Society Competition for University Students</b> Second and Third Prize (Spring 2015 and 2016)</li><li>1. <b>IUT Elite Student Award</b> 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 <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> .  <i>Published, accepted or in revision:</i> <ol style="list-style-type: none"><li>23. <b>Induced subgraphs and tree decompositions</b> <b>VII. Basic obstructions in <math>H</math>-free graphs</b> <i>J. Comb. Theory Ser. B</i> (accepted) with Tara Abrishamin, Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)</li></ol>

22. **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)
21. **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 Vušković (2022)
20. **Hitting all maximum stable sets in  $P_5$ -free graphs**  
*J. Comb. Theory Ser. B* (in revision)  
with Yanjia Li and Sophie Spirkl (2023)
19. **List-3-Coloring ordered graphs with a forbidden induced subgraph**  
*SIAM J. Discrete Math* (accepted)  
with Yanjia Li and Sophie Spirkl (2023)
18. **Induced subgraphs and tree decompositions**  
**II. Toward walls and their line graphs in graphs of bounded degree**  
*J. Comb. Theory Ser. B* 164 (2024) – free access until Dec 19, 2023  
with Tara Abrishami, Maria Chudnovsky, Cemil Dibek, Paweł Rzażewski, Sophie Spirkl and Kristina Vušković.
17. **Induced subgraphs and tree decompositions**  
**IV. (Even hole, diamond, pyramid)-free graphs**  
*Electron. J. Comb* 30(2) (2023)  
with Tara Abrishami, Maria Chudnovsky and Sophie Spirkl.
16. **Induced subgraphs and tree decompositions**  
**III. Three-path-configurations and logarithmic treewidth**  
*Advances in Combinatorics* (6) (2022)  
with Tara Abrishami, Maria Chudnovsky and Sophie Spirkl.
15. **Complexity dichotomy for List-5-Coloring with a forbidden induced subgraph**  
*SIAM J. Discrete Math* 256(6) (2022)  
with Yanjia Li and Sophie Spirkl.
14. **Minimal induced subgraphs of two classes of 2-connected non-Hamiltonian graphs**  
*Discrete Math.* 345(7) (2022)  
with Joseph Cherian, Zishen Qu and Sophie Spirkl.
13. **Edge clique cover of claw-free graphs**  
*J. Graph Theory* 90(3) (2019)  
with Ramin Javadi.  
  
Submitted:
12. **Induced subgraphs and tree decompositions**  
**XII. Grid Theorem for pinched graphs**  
with Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)
11. **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)
10. **Induced subdivisions with pinned branch vertices** (2023)

9. **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)
  8. **Tree independence number for (even hole, diamond, pyramid)-free graphs**  
with Tara Abrishami, Bogdan Alecu, Maria Chudnovsky, Sophie Spirkl and Kristina Vušković (2023)
  7. **Induced subgraphs and tree decompositions**  
**IX. Grid theorem for perforated graphs**  
with Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)
  6. **Induced subgraphs and tree decompositions**  
**VI. Graphs with 2-cutsets**  
with Tara Abrishamin, Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2022)
- Upcoming:*
5. **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.
  4. **Induced subgraphs and tree decompositions**  
**XIV. Non-adjacent neighbors in a hole**  
with Maria Chudnovsky and Sophie Spirkl.
  3. **Chordal graphs, even-hole-free graphs and sparse obstructions to bounded treewidth.**
  2. **List- $k$ -Coloring  $H$ -free graphs for all  $k \geq 5$**   
with Maria Chudnovsky and Sophie Spirkl.
  1. **Certification for  $H$ -free graphs and beyond.**  
with Nicolas Bousquest, Aristotelis Chaniotis, Linda Cook, Sophie Spirkl, Pierron Théo and Sébastien Zeitoun.

## Talks

*Upcoming:*

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

**Mentoring  
Teaching  
Service**

1. **Bounded treewidth in hereditary graph classes** [invited]  
Seymour is 70, ENS de Lyon, France (June 22, 2022)

*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 Omidi (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)