Curriculum Vitae

Chun-Hung Liu

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Appointments:

Sep 2014 – now	Instructor, Department of Mathematics, Princeton University.

Research Interests:

Graph theory, combinatorics, and algorithms.

Education:

Aug 2010 – Aug 2014	PhD program in Algorithms, Combinatorics, and Optimization, School of Mathematics, Georgia Institute of Technology, USA.
Sep 2007 – Jan 2009	M.S., Department of Mathematics, National Taiwan University, Taiwan (R.O.C.)
Sep 2003 – Jun 2007	B.S., Department of Mathematics, National Taiwan University, Taiwan (R.O.C.) (Minor: Department of Computer Science and Information Engineering, National Taiwan University, Taiwan (R.O.C.))

Grants:

- NSF grant DMS-1664593. (07/01/2017 - 06/30/2020)

Publications:

1. *Roman domination on 2-connected graphs* (with G. J. Chang), SIAM J. Discrete Math. 26 (2012), pp. 193-205.

2. *Upper bounds on Roman domination numbers of graphs* (with G. J. Chang), Discrete Math. 312 (2012), pp. 1386-1391.

3. *Trees with strong equality between the Roman domination number and the unique response Roman domination number* (with N. Jafari Rad), Australas. J. Combin. 54 (2012), pp. 133-140.

4. *Roman domination on strongly chordal graphs* (with G. J. Chang), J. Comb. Optim. 26 (2013), pp. 608-619.

5. *A new bound for the 2/3 conjecture* (with D. Král', J.-S. Sereni, P. Whalen and Z. Yilma), Combin. Probab. Comput. 22 (2013), pp. 384-393.

6. *Linear colorings of subcubic graphs* (with G. Yu), European J. Combin. 34 (2013), pp. 1040-1050.

7. *An upper bound on the fractional chromatic number of triangle-free subcubic graphs*, SIAM J. Discrete Math. 28 (2014), pp. 1102-1136.

8. *Deploying robots with two sensors in K_{1,6}-free graphs* (with W. Abbas, M. Egerstedt, R. Thomas and P. Whalen)*, J. Graph Theory 82 (2016), pp. 236-252.

9. *Edge Roman domination on graphs* (with G. J. Chang and S.-H. Chen), Graphs Combin. 32 (2016), pp. 1731-1747.

10. *Minimum size of feedback vertex sets of planar graphs of girth at least five* (with T. Kelly), European J. Combin. 61 (2017), pp. 138-150.

11. *On the minimum edge-density of 4-critical graphs of girth five* (with L. Postle), J. Graph Theory, (in press), doi:10.1002/jgt.22133.

12. *Partitioning H-minor free graphs into three subgraphs with no large components* (with S. Oum), J. Combin. Theory Ser. B, (in press), doi:10.1016/j.jctb.2017.08.003.

13. *Cycle lengths and minimum degree of graphs* (with J. Ma), J. Combin. Theory Ser. B, (in press), doi:10.1016/j.jctb.2017.08.002.

14. *Domination in tournaments* (with M. Chudnovsky, R. Kim, P. Seymour and S. Thomasse), J. Combin. Theory Ser. B, (accepted).

15. *Excluding subdivisions of bounded degree graphs* (with R. Thomas), (submitted), arXiv:1407.4428.

16. *Packing and covering immersions in 4-edge-connected graphs*, (submitted), arXiv:1505.00867.

17. *Size of the largest induced forest in subcubic graphs of girth at least four and*

five (with T. Kelly), (submitted), arXiv:1603.03855.

18. *Characterization of cycle obstruction sets for improper coloring planar graphs* (with I. Choi and S. Oum), (submitted).

19. *Triangle-free graphs that do not contain an induced subdivision of K_4 are 3-colorable* (with M. Chudnovsky, O. Schaudt, S. Spirkl, N. Trotignon and K. Vuskovic), (submitted), arXiv:1704.08104.

20. *Packing topological minors half-integrally*, (submitted), arXiv:1707.07221.

21. *Excluding weak immersions* (with R. Thomas and P. Wollan), manuscript, 2013.

22. *Well-quasi-ordering graphs by the topological minor relation: Robertson's conjecture* (with R. Thomas), manuscript, 2014.

23. *Erdos-Posa property for topological minors* (with L. Postle and P. Wollan), manuscript, 2015.

Academic Honors:

- AMS Simons Travel Grant (2015-2017)
- Best PhD Thesis Award, School of Mathematics, Georgia Tech (2015)
- Honorable Mention for New World Mathematics Awards (2014)
- Bob Price Travel Fellowships, Georgia Tech (2013, 2014)
- Anne Robinson Clough Conference Grant, Georgia Tech (2012, 2013)
- Georgia Tech Algorithms & Randomness Center Student Fellowship (2011, 2013)
- Top Graduate Student Award of School of Mathematics of Georgia Institute of Technology (2012)
- Master's Thesis Award of The Mathematical Society of the Republic of China (2009)
- Honored member of The Phi Tau Phi Scholastic Honor Society of the Republic of China
- National Taiwan University Dean's Award for M.S. degree (2009)
- National Taiwan University Dean's Award for B.S. degree (2007)
- National Taiwan University Presidential Award (5 times, 2003-2007)

Conference presentations:

1. *Half-integral Erdos-Posa property for topological minors*, Workshop on Graph Classes, Optimization, and Width Parameters (Toronto, Canada, October 2017).

2. *Packing topological minors half-integrally*, Geometric and Structural Graph Theory (Banff, Canada, August 2017).

3. *Packing topological minors half-integrally*, Structure in Graphs and Matroids (SiGMa) (Waterloo, Canada, July 2017).

4. *Half-integrally packing topological minors*, CanaDAM (Toronto, Canada, June 2017) **(Invited mini-symposium talk.)**

5. *Packing and covering immersions in 4-edge-connected graphs*, AMS Spring Southeastern Sectional Meeting (Charleston, USA, March 2017) **(Invited special session talk.)**

6. *The Erdos-Posa property*, 25th Anniversary Conference of the ACO program (Atlanta, USA, January 2017) **(Invited talk.)**

7. *Characterizations of minimal cycle obstruction sets for balanced and unbalanced partitionable planar graphs*, New Trends in Graph Coloring (Banff, Canada, October 2016)

8. *Well-quasi-ordering by the topological minor relation*, Symposium for young combinatorialists (Taichung, Taiwan, August 2016) **(Invited talk.)**

9. *Packing and covering immersions in 4-edge-connected graphs*, SIAM Conference on Discrete Mathematics (Atlanta, USA, June 2016) **(Invited mini-symposium talk.)**

10. *Cycle lengths in graphs with large minimum degree*, 2016 Barbados Graph Theory Workshop (Holetown, Barbados, March 2016)

11. *Robertson's conjecture on well-quasi-ordering and topological minors*, Dagstuhl Seminar on Well Quasi-Orders in Computer Science (Dagstuhl, Germany, January 2016)

12. *Packing and covering immersions in 4-edge-connected graphs*, Oberwolfach Workshop on Graph Theory (Oberwolfach, Germany, January 2016)

13. *Minimum degree and lengths of cycles*, 2015 CMS Winter Meeting (Montreal, Canada, December 2015) **(Invited session talk.)**

14. *Forcing existence of cycles by small minimum degree*, Atlanta Lecture Series XVI (Atlanta, November 2015) **(Invited talk.)**

15. *Partitioning H-minor free graphs into three subsets with no large components*, European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB) (Bergen, Norway, August 2015)

16. *Minimum degree and cycles of specific lengths*, The 8th International Congress on Industrial and Applied Mathematics (ICIAM) (Beijing, China, August 2015) **(Invited mini-symposium talk.)**

17. *Erdos-Posa property for topological minors*, 2015 International Conference on Graph Theory and Combinatorics & Eighth Cross-Strait Conference on Graph Theory and Combinatorics (Kaohsiung, Taiwan, June 2015)

18. *Minimum degree and length of cycles*, Connections in Discrete Mathematics

(Burnaby, Canada, June 2015)

19. *Erdos-Posa property for topological minors*, CanaDAM 2015 (Saskatoon, Canada, June 2015) **(Invited mini-symposium talk.)**

20. *Partitioning H-minor free graphs into three subgraphs with no large components*, AMS Spring Western Sectional Meeting (Las Vegas, USA, April, 2015) **(Invited session talk.)**

21. *Colouring so that monochromatic components have bounded size*, 2015 Barbados Graph Theory Workshop (Holetown, Barbados, March, 2015)

22. *Erdos-Posa property for topological minors,* International Workshop on Graph Decomposition (Marseille, France, January, 2015)

23. *Well-quasi-ordering graphs by the topological minor relation,* ICM2014 Satellite Conference on Extremal and Structural Graph Theory (Gyeongju, Korea, August, 2014)

24. *Well-quasi-ordering graphs by the topological minor relation,* 9th International Colloquium on Graph Theory and Combinatorics (Grenoble, France, June, 2014)

25. *Well-quasi-ordering graphs by the topological minor relation,* SIAM Conference on Discrete Mathematics (Minneapolis, USA, June, 2014) **(Invited mini-symposium talk.)**

26. *Structure of graphs with no H-subdivision*, 2014 Barbados Workshop on Structural Graph Theory (Holetown, Barbados, March, 2014)

27. *Well-quasi-ordering graphs by the topological minor relation*, 45th Southeastern International Conference on Combinatorics, Graph Theory, and Computing (Boca Raton, USA, March, 2014)

28. *Well-quasi-ordering graphs by the topological minor relation: Robertson's conjecture*, Bertinoro Workshop on Algorithms and Graphs (Bertinoro, Italy, December, 2013)

29. *Structure theorems and well-quasi-ordering*, 6th workshop on Graph Classes, Optimization, and Width Parameters (Santorini Island, Greece, October, 2013)

30. *Structure theorems and well-quasi-ordering*, Geometric and Topological Graph Theory (Banff, Canada, September, 2013)

31. *Linear colorings of subcubic graphs*, Atlanta Lecture Series in Combinatorics and Graph Theory VIII (Atlanta, USA, February, 2013) **(Invited talk.)**

32. *Linear colorings of subcubic graphs*, Bordeaux Graph Workshop (Bordeaux, France, November, 2012)

33. *The fractional chromatic number of K_3-free subcubic graphs*, The Third Workshop on Graphs and Matroids (Maastricht, The Netherlands, July, 2012)

34. *An upper bound on the fractional chromatic number of triangle-free subcubic graphs*, Graph Theory @ Georgia Tech – Conference Honoring the 50th Birthday

of Robin Thomas (Atlanta, USA, May, 2012) **(Invited talk.)**

35. *(5,2)-configuration on minimum degree at least two K_{1,6}-free graphs,* 36th SIAM Southeastern Atlantic Section Conference (Huntsville, USA, March, 2012) **(Invited mini-symposium talk.)**

Invited Seminar presentations:

1. *The Erdos-Posa property*, Rutgers Discrete Mathematics Seminar, Rutgers University, USA (October, 2017)

2. *The Erdos-Posa property*, seminar, National Sun Yat-sen University, Taiwan (August, 2017)

3. *The Erdos-Posa property*, ACO seminar, Carnegie Mellon University, USA (April, 2017)

4. *Packing and covering in graphs*, Undergraduate Colloquium, Princeton University, USA (April, 2017)

5. *Well-quasi-ordering graphs by the topological minor relation*, MIT Combinatorics Seminar, MIT, USA (December, 2016)

6. *Domination in tournaments*, Graph Theory Seminar, Georgia Tech, USA (November, 2016)

7. *Partitioning graphs in proper minor-closed families into three graphs with no large components*, Seminar on Combinatorics, Institute of Mathematics, Academia Sinica, Taiwan (July, 2016)

8. *Feedback vertex sets in graphs*, Seminar, Huazhong Normal University, China (July, 2016)

9. *Well-quasi-ordering graphs*, Undergraduate Colloquium, Princeton University, USA (February, 2016)

10. *3-coloring H-minor-free graphs with no large monochromatic components*, ACO Student Seminar, Georgia Tech, USA (September, 2015)

11. *Packing and covering topological minors and immersions*, Graph Theory Seminar, Georgia Tech, USA (September, 2015)

12. *Partitioning H-minor-free graphs into three subgraphs with no large components*, Georgia State University, USA (September, 2015)

13. *3-coloring H-minor-free graphs with no large monochromatic components*, University of Science and Technology of China, China (August, 2015)

14. *Partitioning H-minor-free graphs into three subgraphs with no large components*, Nanjing Normal University, China (August, 2015)

15. *3-coloring H-minor-free graphs with no large monochromatic components*, Shanghai Jiao Tong University, China (August, 2015)

16. *Graph structures and well-quasi-ordering*, Combinatorics Seminar, National Central University, Taiwan (July, 2015)

17. *Minimum degree and length of cycles,* Seminar in Combinatorics, Institute of Academia Sinica, Taiwan (July, 2015)

18. *Packing, covering, and the Erdos-Posa property*, Undergraduate Colloquium, Princeton University (March, 2015)

19. *Well-quasi-ordering by the topological minor relation*, Colloquium in Department of Mathematics, University of Central Florida, USA (November, 2014)

20. *Excluding topological minors and well-quasi-ordering*, Princeton Discrete Math Seminar, Princeton University, USA (September, 2014)

21. *Excluding topological minors and well-quasi-ordering*, Columbia Discrete Math Seminar, Columbia University, USA (September, 2014)

22. *Graph structures and well-quasi-ordering,* Graph Theory Seminar, Georgia Tech, USA (August, 2014)

23. *Graph structures and well-quasi-ordering,* KAIST Discrete Math Seminar, KAIST, Korea (July, 2014)

24. *Well-quasi-ordering on graphs,* NTU/NCTS Seminar of Discrete Mathematics, National Taiwan University, Taiwan (July, 2014)

25. *Graph structures and well-quasi-ordering,* Seminar in Combinatorics, Institute of Academia Sinica, Taiwan (July, 2014)

26. *(5,2)-configuration in K_{1,6}-free graphs,* Graph Theory Seminar, Georgia Tech, USA (February, 2013)

27. *Linear colorings of subcubic graphs,* ACO Student Seminar, Georgia Tech, USA (September, 2012)

28. *Roman domination on 2-connected graphs*, CSUMS Seminar, The College of William and Mary, USA (June, 2012)

29. *Roman domination on 2-connected graphs*, Graph Theory Seminar, Georgia Tech, USA (April, 2011)

Academic Experience:

- Senior thesis students advised at Princeton University:
    - Thomas Kelly, 2014-2015.
      Thesis title: *Large induced forests in subcubic graphs*.
    - Andrew Tao, 2016-2017.
      Thesis title: *(1,k)-choosability of graphs with edge lists containing arithmetic progressions*.

- Thesis committee member for:
  - PhD student in Department of Computer Science at Princeton University.
  - PhD student in Department of Computer Science at University of Rome "La Sapienza".
  - Undergraduate students in Department of Mathematics at Princeton University.
- Instructor at Princeton University:
  - MAT 377, Combinatorial Mathematics, Fall 2017.
  - MAT 104, Calculus II, Sections C02 and C03A, Spring 2017.
  - MAT 377, Combinatorial Mathematics, Fall 2016.
  - MAT 202, Linear Algebra with Applications, Sections C03A and C04A, Spring 2016.
  - MAT 377, Combinatorial Mathematics, Fall 2015.
  - MAT 378, Theory of Games, Spring 2015.
  - MAT 104, Calculus II, Sections C03A and C04A, Fall 2014.
- Teaching Assistant at Georgia Institute of Technology:
  - MATH 2602, Linear and Discrete Mathematics, Spring 2012 (2 sections), Fall 2013 (2 sections).
  - MATH 2401, Calculus II, Fall 2010.
- Research assistant:
  - Research in Graph Theory under the direction of Prof. Robin Thomas, supported by the National Science of Foundation, Spring 2011, Summer 2011, Fall 2011, Summer 2012, Fall 2012, Spring 2013, Summer 2013, Spring 2014, Summer 2014.
- Teaching Assistant at National Taiwan University:
  - MATH 1402, Computer Programming, Fall 2008 (97-1), 55 students.
  - MATH 1203, Calculus (General Mathematics) (B) (1), Fall 2008 (97-1), 100 students.
  - MATH 5402, Introduction to Computational Linear Algebra, Spring 2008 (96-2), 50 students.
  - MATH 1202, Calculus (General Mathematics) (A) (2), Spring 2008 (96-2), 70 students.
  - MATH 1201, Calculus (General Mathematics) (A) (1), Fall 2007 (96-1), 70 students.
  - MATH 5407, Introduction to Computational Mathematics, Fall 2007 (96-1), 50 students.

Academic service:

- Referee for journals in combinatorics and computer science:

  Algorithmica; Australasian Journal of Combinatorics; Combinatorica; Discrete Applied Mathematics; Discrete Mathematics; Discrete Mathematics, Algorithms and Applications; Electronic Journal of Combinatorics; European Journal of Combinatorics; Graphs and Combinatorics; Information Processing Letters; Journal of Combinatorial Optimization; Journal of Combinatorial Theory, Series B; Journal of Combinatorics; Journal of Graph Theory; SIAM Journal on Discrete Mathematics.

- Referee for conferences in computer science:

  ACM-SIAM Symposium on Discrete Algorithms (SODA); European Symposium on Algorithms (ESA); International Workshop on Graph-Theoretic Concepts in Computer Science (WG).

- Co-organizer of seminars:
  - Princeton Discrete Math Seminar, Princeton University: Fall 2014, Spring 2015, Fall 2015, Spring 2016, Fall 2016, Spring 2017, Fall 2017.
  - ACO student seminar, Georgia Institute of Technology: Fall 2012, Spring 2013, Fall 2013.