Curriculum Vita

Melissa S. Keranen

University Education

- Ph.D in Mathematics, Michigan Technological University, April 2005.
  Advisor: Prof. Donald L. Kreher.
  Thesis: "Transverse Steiner Quadruple Systems"

- M.S. in Mathematics, Michigan Technological University, Decemeber 2002.
  Advisor: Prof. Donald L. Kreher.
  Thesis: "An Infinite Class of Fibres in CURDs"

- B.S. in Mathematics, Michigan Technological University, December 2000.
  Summa Cum Laude
  Teaching Certificate in Secondary Education

Professional Experience

- **Professor**, Michigan Technological University, 2019-present.
- **Graduate Director, Department of Mathematical Sciences**, Michigan Technological University, 2020-2023.
- **Associate Professor**, Michigan Technological University, 2012-2019.
- **Assistant Professor**, Michigan Technological University, 2006-2012.
- **Lecturer**, Michigan Technological University, 2005-2006.
- **Graduate Teaching Instructor with administrative duties**,
  Michigan Technological University, 2003-2005.

  Duties Included:

  - Providing support to Director of First-Year Mathematics while on leave
  - Administering the Basic Skills Test to all Calculus I students
  - Coordinating the MaCH-1 program (summer math and chemistry program)
  - Course coordinator for Calculus I
  - MTU Mathematics Competition for high school juniors
- **Senior Graduate Teaching Assistant**, Michigan Technological University, 2002-2003.
- **Graduate Teaching Instructor**, Michigan Technological University, 2001-2005.

- **Student Teacher**, Lake Linden-Hubbell High School, September-December, 2000.

  Courses Taught:

  - Algebra I, II
  - Geometry
  - 8^{th} Grade Computers

Research Interests

My research interests are in the fields of design theory and graph theory; including the existence and structure of combinatorial designs, the study of graph decompositions, and graph labelings.

Publications

1. M.S. Keranen, D.L. Kreher and P. Shiue, The quadruple systems of $LF(q)$, $q \equiv 1 \pmod 4$, *Journal of Combinatorial Designs* **11** (2003) no. 5, 339-351.

2. M.S. Keranen and D.L. Kreher, The $3-$designs of $PSL(2, 2^n)$ with block sizes 4 and 5, *Journal of Combinatorial Designs* **12** (2003) 103-111.

3. M.S. Keranen, A.C.H. Ling and R.S. Rees, An infinite class of fibres in CURDs with block sizes two and three, *Journal of Combinatorial Designs*, **12** (2004) 46-71.

4. M.S. Keranen and D.L. Kreher, Transverse Quadruple Systems with 5 holes, *Journal of Combinatorial Designs*, **15** (2006), 315-340.

   Correction to"Transverse Quadruple Systems with 5 holes", *Journal of Combinatorial Designs*, **17** (2009), 492-495.

5. M.S. Keranen, D.L. Kreher, A. Zhuralev, Small Group Divisible Steiner Quadruple Systems, *Electronic Journal of Combinatorics*, **15** (2008), #R40.

6. M.S. Keranen, W. Kocay, D.L. Kreher, B. Li, Degree Sequence Conditions for Partial Steiner Triple Systems, *Bulletin of the Institute of Combinatorics and its Applications*, **57** (2009), 71-74.

7. J. Asplund, M.S. Keranen, Proper Edge Coloring of $BIBD(v, 4, \lambda)$s, *Australasian Journal of Combinatorics*, **47** (2010), 59-76.

8. J. Asplund and M.S. Keranen, Mutually Orthogonal Equitable Latin Rectangles, *Discrete Math*, **311** (2011), 1015-1033.

9. J. Tao, J. Ma, M. Keranen, J. Mayo, CK Shene, DESvisual: A Visualization Tool for the DES Cipher, *Journal of Computing Sciences in College*, **Vol. 27, Number 1** (2011), 81-89.

10. J. Asplund and M.S. Keranen, A Note on Proper Edge Coloring of $BIBDs$ *Bulletin of the Institute of Combinatorics and its Applications*, **63** (2011), 109-110.

11. M.S. Keranen, M.R. Laffin, Fixed block configuration group divisible designs with block size six, *Discrete Math*, **312** (2012), 745-756.

12. J. Tao, J. Ma, M. Keranen, J. Mayo, CK Shene, ECvisual: A Visualization Tool for Elliptic Curve Based Ciphers, *Proceedings of the 43rd ACM Technical Symposium on Computer Science Education*, (2012), 571-576.

13. M.S. Keranen, D.L. Kreher, S. Ozkan, Uniform two-class regular partial Steiner triple systems, *Journal of Combinatorial Designs*, **20** (2012), 161-178.

14. M.S. Keranen, S. Ozkan, The Hamilton-Waterloo problem with 4-cycles and a single factor of n-cycles, *Graphs and Combinatorics*, **29** (2013), 1827-1837.

15. J. Asplund, M.S. Keranen, C. Rodger, Enclosings of λ-Fold 5-Cycle Systems: Adding One Vertex, *Journal of Combinatorial Designs*, **22** (2014), 196-215.

16. C.J. Colbourn, M.S. Keranen, D.L. Kreher, F-Vectors of Pure Complexes of Rank Three, *Discrete Math*, **320** (2014), 26-39.

17. J. Tao, J. Ma, M. Keranen, J. Mayo, CK Shene, C. Wang, RSAvisual: A Visualization Tool for the RSA Cipher, *Proceedings of the 44th ACM Technical Symposium on Computer Science Education*, (2014), 635-640.

18. J. Asplund, M.S. Keranen, C.A. Rodger, Enclosings of λ-fold 5-cycle systems for $u = 2$, *Discrete Math*, **338** (2015), 743-765.

19. M.S. Keranen, Some results on transverse Steiner quadruple systems of type $g^t u^1$, *Ars Combinatoria*, **120** (2015), 85-95.

20. C. Li, J. Ma, J. Tao, M.S. Keranen, J. Mayo, CK Shene, C. Wang, VIGvisual: A Visualization Tool for the Vigenere Cipher, *Proceedings of the 20th annual Conference on Innovation and Technology in Computer Science Education*, (2015), 129-134.

21. J. Ma, J. Tao, M.S. Keranen, J. Mayo, CK Shene, C. Wang, SHAvisual: A Visualization Tool for Secure Hash Algorithm, *122nd ASEE Annual Conference and Exposition*, (2015), 26.1371.1-26.1371.18.

22. J. Asplund, D. Kamin, M.S. Keranen, S. Ozkan, A. Pastine, On the Hamilton-Waterloo problem with triangle factors and C_{3x}-factors, *Australasian Journal of Combinatorics*, Volume **64** (**3**) (2016), 458-474.

23. J. Ma, J. Tao, M.S. Keranen, J. Mayo, CK Shene, C. Wang, AESvisual: A Visualization Tool for the AES Cipher, *Proceedings of the 21st Annual Conference on Innovation and Technology in Computer Science Education*, (2016), 230-235.

24. C.J. Colbourn, M.S. Keranen, and D.L. Kreher, The 3-GDDs of type g^3u^2,*J. Algebra Comb. Discrete Appl* **3(3)** (2016), 135–144.

25. M.S. Keranen, A. Pastine, A Generalization of the Hamilton-Waterloo Problem on Complete Equipartite Graphs, *Journal of Combinatorial Designs*, **25** (2017), 429-476.

26. B. Freyberg, M.S. Keranen, Orientable $\mathbb{Z}_n$-distance magic labeling of Cartesian product of two cycles, *Australasian Journal of Combinatorics*, **69(2)** (2017) 222-235.

27. B. Freyberg, M.S. Keranen, Orientable $\mathbb{Z}_n$-distance magic labeling of Cartesian products of many cycles, *Electronic Journal of Graph Theory and Applications*, **5(2)** (2017) 304-311.

28. J. Hodaj, M.S. Keranen, D.L. Kreher, L. Tollefson, Some new Kirkman signal sets, *Designs, Codes, and Cryptography*, (2017) https://doi.org/10.1007/s10623-017-0445-2.

29. B. Freyberg, M.S. Keranen, Orientable $\mathbb{Z}_n$-distance magic graphs via products, *Australasian Journal of Combinatorics*, **30(3)** (2018) 319-328.

30. M.S. Keranen, J. Lauri, Computing Minimum Strong Rainbow Colorings of Block Graphs, *Discrete Mathematics & Theoretical Computer Science*, **20(1)** (2018) #22.

31. M.S. Keranen, A. Pastine, On the Hamilton-Waterloo problem: the case of two cycles of sizes of different parity, *Ars Mathematica Contemporanea*, https://doi.org/10.26493/1855-3974.17-2, **17 (2)**, (2019), 525-533.

32. M.S. Keranen, D.L. Kreher, M. Salvatore, A. Tripodi, Uniformly resolvable decompositions of K_v in 1-factors and 4-stars, *Australasian Journal of Combinatorics*, **76 (1)** (2019) 55-72.

33. J. Asplund, M.S. Keranen, TS(v, λ) with 2-intersecting Gray codes: $v \equiv 0$ or $4 \pmod{12}$, *Graphs and Combinatorics*, (2020) https://doi.org/10.1007/s00373-019-02107-1.

34. B. Freyberg, M.S. Keranen, d-Handicap tournaments, *Electronic Journal of Graph Theory and Applications*, Accepted.

35. B. Freyberg, M.S. Keranen, G-designs of orders $n \equiv 4, 9 \pmod{12}$ for disconnected unicyclic graphs with 6 edges, In Preparation.

36. J. Lee, M.S. Keranen, Decomposing $K_v - I$ into 5-star factors, In Preparation.

37. M.S. Keranen, Z. Santizo Huerta, On the Hamilton-Waterloo Problem with a single factor of 6-cycles, In Preparation.

Grants

- "Conference on Graph Decompositions at Michigan Technological University", NSF (Principle Investigator), $\$11,999$.
- "The Design of Course Materials and Visualization System for Modern Cryptography", NSF (Co-Investigator), $\$199,964$.
- IMA Participating Institutions Conference Proposal: Combinatorial Configurations and their Applications, (Co-Investigator), $\$2,500$.

Awards and Honors

- 2017-2018 Kliakhandler Fellow
  Michigan Technological University
- Outstanding Faculty Teaching Award (Senior Level),
  Michigan Technological University, 2015.
- Outstanding Faculty Research Award (Junior Level),
  Michigan Technological University, 2011.
- Outstanding Faculty Teaching Award (Junior Level),
  Michigan Technological University, 2008.
- Graduate Student Outstanding Service Award,
  Michigan Technological University, 2005.
- Class of 1950 Dissertation Fellowship,
  Michigan Technological University, 2004.
- Graduate Student Outstanding Research Award,
  Michigan Technological University, 2004.
- 2002 "Woman of Promise", Michigan Technological University, 2002.
- Graduate Student Outstanding Teaching Award,
  Michigan Technological University, 2002.
- Graduate Student Outstanding Teaching Award,
  Michigan Technological University, 2001.
- Departmental Scholar Award from Department of Mathematical Sciences,
  Michigan Technological University, 2000.
- Norman E. Scholz Memorial Award for Excellence
  (Outstanding Mathematical Senior),
  Michigan Technological University, 2000.
- Michigan Technological University Dean's List, 1997-2000.
- Member of Omicron Delta Kappa Honor Society.
- Member of Phi Kappa Phi Honor Society.

Current Graduate Students

1. Zazil Santizo Huerta, PhD Candidate
2. Zehyun Lee, PhD Candidate

Past Graduate Students

1. Prangya Parida, M.S., 2020.
2. Bryan Freyberg*, PhD, 2017.
3. Adrian Pastine**, PhD, 2016.
4. Leah Tollefson, M.S., 2015.
5. Jezerca Hodaj, M.S., 2014
6. Michael Misson, M.S., 2011.
7. David Kamin, M.S., 2011.
8. Melanie Laffin, M.S., 2011.
9. John Asplund, M.S., 2010.
10. Artem Zhuravlev**, M.S., 2007.

$\star$ Committe Chair and Co-Advisor
$\star\star$ Committee Co-Chair and Co-Advisor

Undergraduate Students

1. Juho Lauri, "Computing Minimum Strong Rainbow Colorings of Chordal Graphs", 2014.
2. Gaurav Jain, "Bryant-Scharaschkin & Oberwolfach Problem", 2014.
3. John Asplund, Senior Project "Mutually Orthogonal Equitable Latin Rectangles", 2008.
4. Current advisor for the undergraduate discrete math students.

Courses Taught

- Introduction to Abstract Algebra
- Combinatorics and Graph Theory

- Design Theory
- Graph Theory
- Advanced Topics in Design Theory
- Optimization and Graph Algorithms
- Introduction to Cryptography
- Introduction to Combinatorics
- Introduction to Coding Theory
- Linear Algebra
- Calculus I
- Calculus II
- Data, Functions, and Graphs
- Developmental Math

Professional Affiliations

- The Institute of Combinatorics and its Applications (ICA)
- ICA Council, elected member, 2018-2021, 2022-2024
- Mathematical Association of America

Service

- Graduate Director, Department of Mathematical Sciences, Michigan Technological University, July 2020-present.
- Conference Organizer, *Graph Decompositions, The fourth annual Kliakhandler Conference*, Michigan Tech, August 2018.
- Conference Co-organizer, *Combinatorial Configurations and their Applications*, Michigan Tech, August 2009.
- MA1161 Course Coordinator, August 2014-May 2016
- Hiring committee for Director of First Year Math and Developmental Math Specialist, 2007.

- Departmental Committees
  - Advisory Committee
  - Graduate Committee
  - Promotion, Tenure, and Review Committee
  - Recruitment Committee
  - Undergraduate Committee
- University Committees
  - Maternity Leave Review Committee, 2016
  - Assessment Representative for the Math Department, 2012-2014
  - CSA Dean Review Committee, 2021-2022
  - Graduate Dean Review Committee, 2022-2023
- Doctoral Advisory Committee Member
  - Samuel Judge, April 2018.
  - Alex Klinkhamer, April 2016.
  - Erik Westlund, MTU, May 2010.
- Master's Advisory Committee Member
  - Amanda Stenzelbarton, December 2016.
  - Rachel Rupnow, December 2014.
  - Diego Domenzain-Gonzalez, August 2014.
  - Ellen Kamischke, MTU, December 2013.
  - Kira Durand, MTU, August 2009.
  - Rachel Robertson, MTU, December 2008.
  - Alex Schaefer, MTU, April 2008.
  - Erik Westlund, MTU, June 2006.
- Master's Advisory Committee Member, David Fear, Monash University, April 2014.
- Graduate Teaching Assistant Mentor
  - 2018-2019, Yasasya Batugedara
  - 2018-2019, Prangya Parida
  - 2016-2017 Melinda Kleczynski
  - 2015-2016 Mustafa Aggul
  - 2014-2015 Xueling Li
  - 2011-2012, Ryan Bruner
- Faculty Marshall

  - Spring 2017 Commencement
  - Spring 2011 Commencement

- Refereed papers for: Journal of Combinatorial Designs, Journal of Combinatorial Theory, Series A, SIAM Journal on Discrete Math, Discrete Math, Designs Codes and Cryptography, Ars Combinatoria, Electronic Journal of Combinatorics, Graphs and Combinatorics, JACODESMATH, Australasian Journal of Combinatorics, Bulletin of the ICA, Ars Mathematica Contemporanea, Utilitas Math

- Reviewed books for: Prentice Hall and CRC Press.

- Departmental Graduate Exams
  - Combintorics Proficiency
  - Combinatorics Qualifier
  - Design Theory Comprehensive

Conferences

1. Stinson66-New Advances in Designs, Codes and Cryptography, Toronto, Ontario, June 13-17, 2022. **(Invited Speaker)**

2. CMS 75th+1 Anniversary Summer Meeting, "Decomposing Graphs into Cycles," CMS, Ottowa, June 3-11, 2021. **(Invited Speaker)**

3. 50^{th} Southeastern International Conference on Combinatorics, Graph Theory and Computing, Boca Raton, Florida, March 2019. (Presented)

4. 32nd Midwest Conference on Combinatorics and Combinatorial Computing, Duluth, MN, October 2018. **(Invited Speaker)**

5. Graph Decompositions, The fourth annual Kliakhandler Conference, Houghton, MI, August 2018. (Conference Organizer)

6. 31st Midwest Conference on Combinatorics and Combinatorial Computing, Carrollton, Georgia, October 2017. (Presented)

7. 26th Coast Combinatorics Conference, Kailua-Kona, HI, February 2017. (Presented)

8. Auburn Conference on Designs, Graphs, and Codes, Auburn, AL, January 2016. **(Invited Speaker)**

9. Conference on Combinatorial Designs and Graph Theory in honor of Mohan Shrikhande on the occasion of his retirement, Mount Pleasant, MI, October 2015. **(Invited Speaker)**

10. Algebraic Combinatorics and Applications, The first annual Kliakhandler Conference, Houghton, MI, August 2015. (Presented)

11. SIGCSE 2015: 46th ACM Technical Symposium on Computer Science Education, Kansas City, MO, March 2015, **(Invited Presenter)**, NSF Showcase: "CryptoMentor, A Suite of Visualization Tools for Modern Cryptography".

12. SIGCSE 2015: 46th ACM Technical Symposium on Computer Science Education, Kansas City, MO, March 2015. (Workshop-Presented)

13. 45^{th} Southeastern International Conference on Combinatorics, Graph Theory and Computing, Boca Raton, Florida, March 2014. (Presented)

14. Twenty-Fifth Midwest Conference on Combinatorics, Cryptography, and Computing, Las Vegas, NV, October 2011. (Presented)

15. Consortium for Computing Sciences in Colleges, Huntington, Indiana, September 2011. (Presented)

16. 3rd Canadian Discrete and Algorithmic Mathematics Conference, Victoria, Canada, May 2011. (Presented)

17. 42^{nd} Southeastern International Conference on Combinatorics, Graph Theory and Computing, Boca Raton, Florida, March 2011. (Presented)

18. 33^{rd} Australasian Conference on Combinatorial Mathematics and Combinatorial Computing, Newcastle, Australia, December 2009. (Presented)

19. Combinatorial Configurations and their Applications, MTU, August 2009. (Presented)

20. 39^{th} Southeastern International Conference on Combinatorics, Graph Theory and Computing, Boca Raton, Florida, March 2008. (Presented)

21. 1st Canadian Discrete and Algorithmic Mathematics Conference, Alberta, Canada, May 2007. (Presented)

22. Michigan Technological University Research Symposium, January 2007. (Presented)

23. 18^{th} Midwestern Conference on Graph Theory, Cryptography and Computing, Las Vegas, Nevada, November 2003.

24. 33^{rd} Southeastern International Conference on Combinatorics, Graph Theory and Computing, Boca Raton, Florida, February 2002.(Presented)

25. Design Theory 2001, Resolvability and Parallelisms, Vancouver, B.C., Canada, May 2001.