

Selcuk Koyuncu

Curriculum Vitae

Department of Mathematics and Computer Science
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Education

- 2012 **Ph. D. in Mathematics**, Drexel University, Philadelphia, USA
2006 **M. S. in Mathematics**, Georgia State University, Atlanta, USA
2000 **B. S. in Mathematics**, Abant Izzet Baysal University, Bolu, Turkey

Employment

- 8/2025–Present Coppin State University
Associate Professor and Department Head
- 8/2022–7/31/2025 University of North Georgia
Professor
- 8/2018–8/2022 University of North Georgia
Associate Professor
- 8/2014–8/2018 University of North Georgia
Assistant Professor
- 8/2013–8/2014 Atlanta Metropolitan State College, USA
Assistant Professor and Department Head.
- 8/2012–8/2013 Morehouse College, USA
Visiting Assistant Professor.
- 9/2006–6/2012 Drexel University, USA
Research Assistant
- 6/2004–6/2006 Georgia State University, USA
Research Assistant
- 9/2000–9/2002 Abant Izzet Baysal Univeristy, Bolu, Turkey
Research Assistant

Research Interest

- Applied Mathematics including Stochastics Operators, Linear and Multilinear Algebra, Numerical Linear Algebra and Combinatorial Matrix Theory

Peer- Reviewed Papers/Publications

1. **Selcuk Koyuncu**, Ritvik Shah and Cenap Ozel, *Topological and Numerical Approaches to Surface Transformations*, Journal of Geometry and Physics, 2025.
<https://doi.org/10.1016/j.geomphys.2025.105472>
2. **Selcuk Koyuncu**, Mryr Ali Ahamad and Cenap Ozel, *On Topology and Analysis of Pairwise Comparison matrices PCM*, Commun.Fac.Sci.Univ.Ank.Ser. A1 Math. Stat, 2025.
<https://doi.org/10.31801/cfsuasmas.1542622>
3. Ali Bayati Eshkaftaki, **Selcuk Koyuncu**, Javad Mashreghi, and Moustafa Nasri, *On Extreme Points of*

Symmetric Doubly Stochastic Matrices, Operator Theory, Springer Nature, 2025.

<https://doi.org/10.1007/978-3-0348-0692>

4. **Selcuk Koyuncu**, Eman Ahmad and Cenap Ozel, *Topology of Hankel matrices and applications*, Journal of Geometry and Physics 199 (2024), 105150.
<https://doi.org/10.1016/j.geomphys.2024.105150>
5. Lei Cao, Ali Bayati Eshkaftaki, and **Selcuk Koyuncu**, *Variations in the Sub-Defect of Doubly Substochastic Matrices*, Special Matrices 2024; 12: 20240012.
<https://doi.org/10.1515/spma-2024-001250>
6. **Selcuk Koyuncu**, Cenap Ozel, Ibtesam Alshammari and Majed Albaity, *Lie group and Lie algebra of Toeplitz matrices*, Ann. Univ. Sci. Budapest. Eötvös Sect. Math.66(2023), 73–89.
7. **Selcuk Koyuncu**, Cenap Ozel, and Majed Albaity. *On Topology of Centrosymmetric Matrices with applications*, Advances in Mathematics: Scientific Journal 12 (2023), no.11, 947–962.
<https://doi.org/10.37418/amsj.12.11.2>
8. Chloe Doyoung and **Selcuk Koyuncu**, *Properties of Schwarz Matrices in Discrete-time linear Systems*, Advances in Mathematics: Scientific Journal 12 (2023), no.7, 643–652.
<https://doi.org/10.37418/amsj.12.7.1>
9. Ozen Ozer, **Selcuk Koyuncu**, and Wynn Kwiatkowski, *Permanent of Toeplitz matrices with Narayana entries*, Annals of the University of Craiova, Mathematics and Computer Science Series, Volume 50(2), 2023, Pages 353–361.
<https://doi.org/10.52846/ami.v50i2.1716>
10. Zhi Chen, Lei Cao, **Selcuk Koyuncu**, *The extreme points of centrosymmetric transportation polytopes*, Linear Algebra and its Applications, Volume 608, Issue 3 (2021), Pages 214-235
<https://doi.org/10.1016/j.laa.2020.08.029>
11. Lei Cao, Zhi Chen, **Selcuk Koyuncu**, and Huilan Li, *Permanents of doubly substochastic matrices*. Linear and Multilinear Algebra Volume 68, Issue 3 (2021),
<https://doi.org/10.1080/03081087.2018.1513448>
12. Lei Cao, Zhi Chen, Xuefeng Duan, **Selcuk Koyuncu**, and Huilan Li, *Diagonal Sums of Doubly Substochastic Matrices*, The Electronic Journal of Linear Algebra: Vol. 35 (2019)
<https://doi.org/10.13001/1081-3810.3760>
13. Lei Cao and **Selcuk Koyuncu**, *A note on multilevel Toeplitz matrices*, Spec. Matrices 2019, 7:114(126)
<https://doi.org/10.1515/spma-2019-0011>
14. Lei Cao, Ariana Hall, and **Selcuk Koyuncu**, *A short note on extreme points of certain polytopes*, Spec. Matrices, 20208 : 36(39)
<https://doi.org/10.1515/spma-2020-0005>
15. Lei Cao and **Selcuk Koyuncu**, *Sub-Defect of Product of Doubly Substochastic Matrices*, Linear and Multilinear Algebra, Vol.65(4):653- 657,2017.
<https://doi.org/10.1080/03081087.2016.1201040>
16. Lei Cao and **Selcuk Koyuncu**, *Symmetric Integer Matrices Having Integer Eigenvalues*, Int. J. Math. Math. Sci., Art.ID 3471438, 6 pp, 2016.
<https://doi.org/10.1155/2016/3471438>
17. Lei Cao, **Selcuk Koyuncu**, and Timmothy Parmer, *A Minimal Completion of Doubly Substochastic Matrix*, Linear and Multilinear Algebra, Vol.64(11):2313-2334, 2016.
<https://doi.org/10.1080/03081087.2016.1155531>
18. **Selcuk Koyuncu** and Kevin R.Bowman, *Product of Several Two-level Toeplitz Operators*, Journal of Mathematics Research, Vol.5, No.2 (2013).
<https://doi.org/10.5539/jmr.v5n2p61>
19. **Selcuk Koyuncu** and Hugo J.Woerdeman, *The Inverse of Nonsymmetric Two-level Toeplitz Operator Matrices*, Linear Algebra and Its Applications, Vol.437 (2012) pp.2142-2158.
<https://doi.org/10.1016/j.laa.2012.04.048>
20. **Selcuk Koyuncu** and Hugo J.Woerdeman, *The Inverse of a Two-level Positive Definite Toeplitz Operator Matrix*, Operator Theory: Advance and Applications, Vol.218, 387401, 2011.
<https://link.springer.com/chapter/10.1007/978-3-0348-0221-517>
21. Marina Arav, Frank J. Hall, **Selcuk Koyuncu**, Zhongshan Li and Bhaskara Rao, *Rational Realizations of the Minimum Rank of a sign pattern Matrix*, Linear Algebra and Its Applications, 409 (2005) 111-125.
<https://doi.org/10.1016/j.laa.2005.05.001>

Papers in Review

1. **Selcuk Koyuncu**, Ronak Nouri, and Stephen Providence, *Machine Learning Model for Sparse PCM Completion*, International Journal of Approximate Reasoning, Under Review, 2025.
2. Ali Bayati Eshkaftaki, Selcuk Koyuncu, and Ritvik Shah, *Extreme Points of a Certain Class of Doubly Substochastic Matrices*, Linear Algebra and its Applications, Under Review, 2025.
3. **Selcuk Koyuncu**, Zeewoo Lee, Sojung Oh, and Jaehee Yoon, *Combinatorial Properties of Certain Toeplitz Matrices*, Journal of Algebra Combinatorics Discrete Structures and Applications, Accepted, September 2025.
4. Hanifa Zekraoui, **Selcuk Koyuncu**, and Cenap Ozel, *On Small Doubling and GAP of Structured Matrices*, Communications in Algebra, Under Review, 2025.
5. **Selcuk Koyuncu**, Ali Bayati Eshkaftaki, and Lei Cao, *Linear Preservers of Sub-Defect of Doubly Substochastic Matrices*, Results in Mathematics, Under Review, 2025.

Papers with Undergraduate Students

1. At UNG, I have supervised an undergraduate student Wynn Kiatkowski. Wynn's project has been published. The title of the project is *Permanent of Toeplitz Matrices with Narayana Entries*.
2. At UNG, I have supervised an undergraduate student Ariana Hall. Ariana's project has been published in the Journal of Special Matrices. The title of the project is *A Minimal Completion of Doubly Substochastic Matrix*. <https://doi.org/10.1515/spma-2020-0005>
3. At UNG, In spring 2018 I have supervised senior project of an undergraduate student Thomas Matthews, and his project is titled *Properties of One level Toeplitz Operators*
4. At UNG, I have supervised an undergraduate student Timmothy Parmer. Timmothy's project has been published in Linear and Multilinear Algebra. The title of the project is *A Minimal Completion of Doubly Substochastic Matrix*. Timmothy has presented this paper at conference, Recent Advances in Linear Algebra and Graph Theory , held in University of Tennessee-Chattanooga, March 5-6, 2016. He also presented this paper at UNG's 21st Annual Research Conference, Friday, March 25, 2016 <https://doi.org/10.1080/03081087.2016.1155531>
5. At Morehouse College, I have supervised and supported an undergraduate student Kevin R. Bowman. Bowman's project has been published in Journal of Mathematics Research, Vol.5, No.2 (2013.) The title of the project is *Product of Several Two-level Toeplitz Operators*. <https://doi.org/10.5539/jmr.v5n2p61>

Conferences and Seminar Talks

1. Linear Preservers of Sub-defect of Doubly Stochastic Matrices, 10th Annual Research Conference, Coppin State University, Fall 2025.
2. Linear Preservers of Sub-defect of Doubly Stochastic Matrices, University of Nevada, Matrix Seminar, Spring 2025.
3. Results in Toeplitz Operators, Izmir Institute of Technology, Turkiye, Departmental Colloquium , Spring 2024.
4. Extreme Points of Infinite-dimensional Symmetric Doubly Stochastic Matrices, University of Nevada, Matrix Seminar, Spring 2024.
5. Extreme Points of Infinite-dimensional Symmetric Doubly Stochastic Matrices, University of North Georgia, Departmental Colloquium, Spring 2024.
6. A short note on multilevel Toeplitz matrices, AMS joint Mathematical Meeting, January 7, 2021.
7. The REED summit Conference, University of North Georgia, Sept. 23, 2020.
8. Minimal Completion and Sub-defect of Product of Doubly Sub-Stochastic Matrices, Math Club at UNG, March 20, 2019
9. Minimal Completion and Sub-defect of Product of Doubly Sub-Stochastic Matrices, AMS Spring Southeast Sectional Meeting, March 16, 2019
10. Kennesaw State University's Center for Excellence in Teaching and Learning, October 13, 2016.
11. The inverse of two level Toeplitz operator Matrices, Matrix Theory Seminar at Georgia State University, November 3, 2017
12. A minimal completion and sub-defect of doubly substochastic matrices, Joint Mathematical Meeting (JMM), Jan 4-7, 2017, Atlanta, Georgia.

13. Sub-Defect of Product of Doubly Substochastic Matrices, University of North Georgia, Weekly Seminar, November 14, 2016
14. The inverse of positive definite two level Toeplitz operator matrices, Recent Advances in Linear Algebra and Graph Theory, held in University of Tennessee , Chattanooga, March 5-6, 2016.
15. A minimal Completion of Doubly Substochastic Matrix, University of North Georgia, Weekly Seminar, November 2015.
16. The inverse of symmetric Toeplitz Operator Matrices, Atlanta, GA, The SIAM Conference on Applied Linear Algebra (LA09), held October 26-29, 2015.
17. The inverse of Nonsymmetric Two-level Toeplitz Operators, University of North Georgia, Weekly Seminar, April 2015.
18. The Research on Teaching and Learning Summit at Kennesaw State University, Kennesaw, GA ,February 2015.
19. How Learning Works, New Faculty Institute, University of North Georgia, Fall 2014 and Spring 2015.
20. The Inverse of a Two-level Positive Definite Toeplitz Operator, the 22nd International Workshop on Operator Theory and its Applications (IWOTA 2011), Seville, Spain, July 3-9, 2011.
21. An Algorithm for Computing the Inverse of Multilevel Toeplitz Matrices, The SIAM Conference on Applied Linear Algebra (LA09), held October 26-29, 2009, at the Embassy Suites Hotel Monterey Bay-Seaside in California.
22. Extensions of Gohberg-Semencul formula, International Workshop on Operator Theory and Applications(IWOTA-2008), Williamsburg, VA.
23. An Algorithm for Computing the Inverse of Multilevel Toeplitz Matrices, International Symposium on Mathematical Theory of Networks and Systems (MTNS 2008), Blacksburg, VA.
24. Two-level Gohberg-Semencul Formula, Joint Mathematical Meeting(JMM 2011), New Orleans, LA.
25. Product of Several Two-level Toeplitz Operators, University of North Georgia, Weekly Seminar, November 2014.
26. The inverse of two-level Toeplitz Matrices, Georgia Institute of Technology, Analysis Seminar, September 2012.
27. Transfer Function Realization of Rational Inner Functions, Drexel University, Analysis Seminar, Philadelphia, May 2012
28. Inverses of multilevel Toeplitz matrices, Drexel University, Analysis Seminar, Philadelphia, April 2011
29. Zero Product of Two-level Toeplitz Operators on Hardy space of bidisc, Drexel University, Analysis Seminar, Philadelphia, April 2012
30. Computing the Inverse of Multivariable Toeplitz Matrix, Temple University, Scientific Computing Seminar, Philadelphia, October 2011
31. An Algorithm for Computing the Inverse of Multilevel Toeplitz Matrices, Drexel University, Analysis Seminar, Philadelphia, November 2010

Honors and Awards

- 2025 *I won Presidential Innovative Award for Excellence in Research and Mentoring of Undergraduate Students.*
- 2017 *UNG Incentive Award with project titled "Enhancing Student Success and Retention Rate by implementation of Active Learning", joint with Bikash Das and Jerry Graveman.*
- 2016 *UNG Student Technology Innovation Grant (with Dr. Minsu Kim).*
- 2010 *International Travel Award from the Office of International Programs, Drexel University, to attend the 22nd International Workshop on Operator Theory and its Applications (IWOTA 2011), Seville, Spain, July 3-9, 2011*
- 2012 *Best PhD Thesis Award, Drexel University.*
- 2009 *SIAM Student Travel Award to attend the SIAM Conference on Applied Linear Algebra (LA09), held October 26-29, 2009, at the Embassy Suites Hotel Monterey Bay-Seaside in California.*
- 2009 *Outstanding Graduate Student Award, Drexel University.*
- 2009 *Certificate of Recognition by Society of Applied and Industrial Mathematics (SIAM)*
- 2006 *Graduate Fellowship, Drexel University.*

Teaching Experience

At UNG I have taught both undergraduate and graduate level courses. Please see the list below.

- Introduction to Real Analysis
- Introduction to Complex Analysis
- Advanced Linear Algebra
- Introduction to Linear Algebra
- Introduction to Linear Programming with Matlab
- Mathematical Proof
- Multivariate Calculus
- Calculus II
- Calculus I
- Business Calculus
- Research Experience for Undergraduate

At AMSC I have taught both undergraduate and graduate level courses. Please see the list below.

- Introduction to Differential Equation
- Advanced Linear Algebra
- Calculus I and Calculus II
- College Algebra
- Precalculus
- Elementary Statistics

At Morehouse College, I have taught both undergraduate and graduate level courses. Please see the list below.

- Matrix Theory
- Introduction to Number Theory
- Calculus I
- Independent Study for Undergraduate Research
- Precalculus

At Drexel University, I have taught both undergraduate and graduate level courses. Please see the list below.

- Complex Variables for Engineers
- Introduction to Mathematical Analysis II
- Calculus I and Calculus II
- Linear Algebra
- Linear Modeling for Engineers
- Precalculus

Academic and Professional Activities

- Reviewer for Linear Algebra and Its Application
- Reviewer for Linear and Multilinear Algebra
- Reviewer for American Mathematical Society (Mathematical Review)
- Electronic Journal of Linear Algebra
- Reviewer for Operator and Matrices

Programming language and Skills

Languages Python, Java, Visual Basic, C, C++, Parallel programming.
Packages Maple, Matlab, Mathematica, Geometry Sketchpad.
Operating system Linux, OS X(Mac OS), Microsoft Window.
Tools MS office, LaTeX.

References

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Lei Cao

Associate Professor
Department of Mathematics
Nova Southeastern University
3301 College Ave, Fort Lauderdale, FL 33314
Email address: leicaomath@gmail.com
Phone: 954-262-7931

Eric Choi(Teaching)

Associate Professor
Department of Mathematics
Georgia Gwinnett College
1000 University Center Ln, Lawrenceville, GA
30043
Email address: ericchoi314@gmail.com
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