

Antara Mukherjee

CONTACT INFORMATION Department of Mathematical Sciences
The Citadel,
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Citizen of The United States of America.

EDUCATION

Ph.D. in Mathematics,
The University of Oklahoma,
Norman, Oklahoma USA
December 2008

- Advisor: Dr Noel P. Brady
- Area of Study: Geometric Group Theory

M.S. in Pure Mathematics,
Calcutta University, Kolkata, India,
August 1999

B.S.
Calcutta University, Kolkata, India,
August 1997

- Major: Mathematics
- Minors: Physics, Chemistry, English.

APPOINTMENTS

- Professor, The Citadel, Fall 2022 to present .
- Associate Professor, The Citadel, Fall 2016 – Summer 2022.
- Assistant Professor, The Citadel, Fall 2010 – Summer 2016.
- Adjunct Professor, The Citadel, Fall 2009 – Spring 2010.
- Visiting Assistant Professor, The Citadel Spring 2009.
- Graduate Teaching Assistant, University of Oklahoma, Fall 2002 – Fall 2008.

AWARD

- C.A. Medberry Award for Dedication to Teaching, 2018.

SABBATICAL

- Semester long sabbatical, Spring 2019.

FELLOWSHIPS AND SCHOLARSHIPS

- The Citadel Foundation Research Grant for 2013-2014, 2014-2015, 2015-2016, 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, 2022-2023.
- GenCyber Grant (Co-PI), 2018, 2019, 2020, 2021, 2022.
- IdeaLab Fellow for the year 2013, ICERM, Brown University, Providence, RI.
- MAA-SE section Project NExT fellow for 2011 – 2012.
- University of Oklahoma, Department of Mathematics Fellowship 2002 – 2008.
- Robert E. and Mary B. Sturgis Scholarship 2007-2008.

ACADEMIC EXPERIENCE

Courses taught at The Citadel

- History of Mathematics (**Math 512**, Graduate)
- Modern Geometry (**Math 521**, Graduate)
- Modern Algebra (**Math 532**, Graduate)
- Senior Research Project (**Math 499**, Undergraduate)
- Number Theory (**Math 411**, Undergraduate)
- Topics in Cryptography (**Math 390**, Undergraduate)
- Modern Geometry (**Math 305**, Undergraduate)
- Modern Algebra (**Math 303**, Undergraduate)
- Applied Cryptography (**Math 302**, Undergraduate)
- Discrete Mathematics (**Math 206**, Undergraduate)
- An Introduction to the Practice of Mathematics (**Math121**, Undergraduate)
- Analytic and Geometric Calculus 2 (**Math 132**, Undergraduate)
- Finite Mathematics (**Math 105**, Undergraduate) Course Coordinator.
- Analytic and Geometric Calculus 1 (**Math 131**, Undergraduate)
- Elementary Math Modeling (**Math 104**, Undergraduate)
- Applied Calculus I (**Math 106**, Undergraduate)
- College Algebra and Trigonometry (**Math 119**, Undergraduate)

Undergraduate Student Research Projects supervised at The Citadel (joint with Dr. R. Flórez) .

- “Sum of a Fibonacci Series and its extension”, J. Watson, The Citadel, 2013 – 2014.
- “Sum of Squares of Lucas Numbers”, K. Lindberg, The Citadel, 2014 –present.
- “Experiments in Topology”, J. Andrus and T. Knutson-Harper, The Citadel, 2014 – 2015.
- “Finite sums of powers of Fibonacci numbers”, N. McAnally, The Citadel, 2015 – 2016.
- “Identities for Generalized Fibonacci Polynomials”, N. McAnally, The Citadel, 2016 – 2017.
- “A Rational Fibonacci to the n Identity and its extensions”, M. Harbol and L. Tiscareño, 2016 –2017.
- “An identity of Fibonacci and Lucas to the fifth and third powers”, W. Wang, 2016–2017.
- “A Fibonacci determinant and its extensions”, H. Ching, 2016–2017.
- “Matrices in Hosoya triangle”, M. Blair, 2018.
- “A Fibonacci and Lucas Identity”, E. Spoehel, 2018.
- “The Determinant Hosoya triangle”, M. Blair 2018–present and H. Ching 2018–2020.
- “Infinite Families of integral graphs with four and five distinct eigenvalues”, H. Ching 2018–2019.

Other Undergraduate Student Research Projects supervised at The Citadel

- “A Style of Integer Partitions”, D. Bolus, 2017–2018, (*joint with Dr. D. Trautman*) .
- “Counting Sequences”, S. Addy and Z. Parker, 2018, (*joint with Dr. B. Swart*) .
- “Lucky Numbers”, S. Addy and Z. Parker, 2019–present, (*joint with Dr. B. Swart*) .
- “Prime Progressions”, A. Fannin, 2020–present, (*joint with Dr. B. Swart*) .
- “A study of Lie Groups”, M. Dittrich, 2020, (*joint with Dr. B. Swart*).
- “Ulam Numbers”, A. Reynolds 2021, (*joint with Dr. B. Swart*) .
- “Properties of Sequences obtained from other Sequences” R. Henriquez 2021, (*joint with Dr. B. Swart*)
- “More on Prime Progressions”, S. Gomez, (*joint with Dr. B. Swart*).
- “Prime numbers in the Ulam sequence”, W. Boyd, (*joint with Dr. B. Swart*).

Courses taught as an Instructor at University of Oklahoma

- Precalculus (Undergraduate)
- Business Calculus I (Undergraduate)

Courses taught as an Assistant to the Instructor at University of Oklahoma

- Calculus II (Undergraduate)
- Calculus I (Undergraduate)

PUBLICATIONS
IN PEER-
REVIEWED
JOURNALS

- R. Flórez, R. Higuaita, and A. Mukherjee, “ The Geometry of some Fibonacci Identities in the Hosoya Triangle”, (to appear in *Involve*).
- M.Blair, R. Flórez, and A. Mukherjee, “Honeycombs in the Hosoya triangle”, *Math Horizons*, February 2022.
- M.Blair, R. Flórez, and A. Mukherjee, “Geometric Patterns in the Determinant Hosoya Triangle”, *INTEGERS* (21) 2021, Paper No. A90.
- M. Blair, R. Flórez, A. Mukherjee, and J.L. Ramirez, “Matrices in the determinant Hosoya triangle”, *Fibonacci Quart.* 58 (2020), no. 5, 34–54.
- H. Ching, R. Flórez, and A. Mukherjee, “Families of Integral CoGraphs within a Triangular Array ”, *Spec. Matrices* , 8 (2020), 57–73.
- M. Blair, R. Flórez, and A. Mukherjee, “Matrices in the Hosoya triangle”, *Fibonacci Quart.* 57 (2019), no. 5, 15–28.
- R. Flórez and A. Mukherjee, “Introducing Students to Conjectures, Exploration and Visual Proofs using Experiments in Topology”, *PRIMUS*, DOI: 10.1080/10511970.2018.1506530.
- R. Flórez, R. Higuaita, and A. Mukherjee, “Star of David property and other patterns in Hosoya’s polynomial triangles”, *Journal of Integer Sequences* Vol 21. (2018), Article 18.4.6.
- R. Flórez, N. McAnally, and A. Mukherjee, “Identities for Generalized Fibonacci Polynomials”, *INTEGERS* 18B (2018).
- R. Flórez, R. Higuaita, and A. Mukherjee, “Characterization of the GCD properties for the generalized Fibonacci polynomial sequences”, *INTEGERS* 18 (2018) Paper No. A14.
- R. Flórez and A. Mukherjee, “Solving open problems as a first research experience”, *Teaching Math and its Applications, An International Journal of IMA Oxford Academic*, DOI:10.1093/teamat/hrx008.
- A. Mukherjee, “Isoperimetric inequalities using Varopoulos transport”, *J. Ramanujan Math. Soc.* 31 (2016), no.3, 307–321.
- R. Flórez, R. Higuaita, and A. Mukherjee, “Alternating sums in the Hosoya polynomial triangle”, *Journal of Integer Sequences* 17.9 (2014), 1-17.

- T. Mecham and A. Mukherjee, “Hyperbolic Groups that fiber in infinitely many ways”, *Algebraic & Geometric Topology*, Vol. 9 (2009), 2101–2120.

SUBMITTED
AND ARTICLES
IN
PREPARATION

- S. Addy, Z. Parker, B. Baker-Swart, and A. Mukherjee, “Characterization of Lucky and Unlucky Numbers”, (*Submitted to peer-reviewed journal*).
- S. Addy, Z. Parker, B. Baker-Swart, and A. Mukherjee, “Extension of Wilson’s Theorem”, (*Submitted to peer-reviewed journal*).
- R. Flórez, and A. Mukherjee, “Introduction to the Practice of Mathematics”, (*Book in preparation*).
- A. Fannin, B. Baker-Swart, and A. Mukherjee, “Prime progressions”, (*In preparation*).
- H. Ching, R. Flórez, and A. Mukherjee, “Prime Numbers in the Determinant Hosoya Triangle”, (*In preparation*).
- T. Mecham and A. Mukherjee, “Large LOIs”, (*In preparation*).

STUDENT
PUBLICATIONS
IN PEER-
REVIEWED
JOURNALS

- J. Watson, Solution to Problem B-1133, *Fibonacci Quarterly*, (53), (3) August 2014.
<http://www.fq.math.ca/Problems/ElemProbSolnAug14.pdf>.
- K. Lindberg, Solution to Problem B-1154, *Fibonacci Quarterly*, (53), (3) August 2015.
<http://www.fq.math.ca/Problems/ElemProbSolnAugust2015.pdf>.
- N. McAnally, Solution to H-766, *Fibonacci Quarterly*, (54), (4) November 2016, (Recognition)
<http://www.fq.math.ca/Problems/November2016advanced.pdf>.
- M. Harbol and L. Tiscareño, Solution to Problem B-1190, *Fibonacci Quarterly*, (55) (2), May 2017, (Recognition)
<http://www.fq.math.ca/Problems/ElemProvSolnMay2017.pdf>
- H. Ching, Solution Problem B-1192, *Fibonacci Quarterly* (55) 2017, 278–279 (3), August 2017 (Recognition).
<http://fq.math.ca/Problems/ElemProSolnAugust2017.pdf>
- W. Wang, Solution to B-1196 *Fibonacci Quarterly* (55) 2017, 278–279. (4), November 2017 (Recognition).
<http://www.fq.math.ca/Problems/ElemProbSolnNov2017.pdf>

- H. Ching, Solution Problem B-1208, *Fibonacci Quarterly* (56) 2018, 179–182 (2), May 2018 (Recognition).
<http://fq.math.ca/Problems/ElemProSolnMay2018.pdf>
- D. Bolus, Solution Problem 2023, *Mathematics Magazine* (91) 2018, 230–238 (3), May 2018 (Recognition).
<https://www.tandfonline.com/doi/full/10.1080/0025570X.2018.1456271>
- E. Spoehel, Solution Problem B-1218, *Fibonacci Quarterly* (56) 2018, 366–372 (4), Nov 2018 (Recognition).
<https://www.fq.math.ca/Problems/ElemProbSolnNov2018.pdf>
- S. Addy and Z. Parker, Solution Problem 2050, (2019) Problems and Solutions, *Mathematics Magazine*, 92:3, 230–238, (Recognition).
<https://www.tandfonline.com/doi/full/10.1080/0025570X.2019.1599245>

PRESENTATIONS

- “Properties of the Determinant Hosoya Triangle”, College of Charleston Mathematics Colloquium (Virtual), April 2021
- “Families of Integral Cographs within triangular arrays”, (Virtual) 52nd Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Hosted by Florida Atlantic University, March 2021
- “Matrices in the Determinant Hosoya triangle”, (Virtual) Fibonacci Conference, Hosted by University of Sarajevo, July 2020.
- “Geometry of some Fibonacci identities in the Hosoya triangle”, 2018 Fibonacci Conference, Dalhousie University, Halifax, Canada, July 2018 (funded by The Citadel Foundation Presentation Grant).
- “Solving open problems as a first research experience”, Special Session on Undergraduate Research at the MAA -SE section meeting, March 2017, Macon, GA, (funded by The Citadel Foundation Presentation Grant).
- “Strong Divisibility Property of Generalized Fibonacci Polynomials”, Joint Mathematics Meetings, Atlanta, GA, January 2017. (funded by The Citadel Foundation Presentation Grant).
- “GCD Properties of Generalized Fibonacci Polynomials”, Mathematics Colloquium at The College of Charleston, October 2016.
- “The Isoperimetry Problem -Why bees know best”, Math Club, April 2016, The Citadel.

- “Introducing students to conjecture and proofs using experiments in topology”, MAA -SE section meeting, March 2016, Birmingham, AL, (funded by The Citadel Foundation Presentation Grant).
- “Introducing students to conjecture and proofs using experiments in topology”, Carolina Math Seminar, Newberry College, March 2016.
- “GCD Properties of the Hosoya polynomial Triangle”, MAA -SE section Meeting, March 2015, Wilmington, North Carolina, (funded by The Citadel Foundation Presentation Grant).
- “Some algebraic and geometric properties of the Hosoya polynomial triangle”, Mathematics Colloquium at The College of Charleston, October 2014.
- “Properties of the Hosoya Polynomial Triangle”, MAA -SE section Meeting, March 2014, Cookeville, Tennessee, (funded by The Citadel Foundation Presentation Grant).
- “Properties of the Hosoya Polynomial Triangle”, Carolina Math Seminar, March 2014, The Citadel, Charleston South Carolina.
- “Towards Efficient Homomorphic Encryption”, ICERM Idea Lab for Early Career Researchers, Brown University Providence, RI, July 2013, (funded by ICERM, Brown University).
- “A Research Overview”, ICERM Idea Lab for Early Career Researchers, Brown University Providence, RI, July 2013, (funded by ICERM, Brown University).
- “Non-Euclidean Geometry -Euclid’s chagrin or Gauss’s triumph?”, Sigma Xi Brown bag lunch talk, October 2011, The Citadel.
- “Isoperimetric inequalities using Varopoulos Transport”, MAA -SE section Meeting, April 2011, Tuscaloosa, Alabama, (funded by The Citadel Foundation Presentation Grant).
- “Isoperimetric inequalities using Varopoulos Transport”, Regional Campuses Mathematics Seminar, Fall Meeting at USC Salkehatchie, Nov 5 2010.
- “Isoperimetric inequalities using Varopoulos Transport”, Mathematics Colloquium at The College of Charleston, October 2010.
- “Hyperbolic groups that fiber in infinitely many ways”, at the Department of Mathematics and Computer Science, The Citadel, Spring 2010.
- “Isoperimetric inequalities using Varopoulos Transport-the 2-dimensional case”, Department of Mathematics and Computer Science, The Citadel, November 2008.

- “Hyperbolic groups that fiber in infinitely many ways”, Geometry and Topology seminar at the Department of Mathematics, University of Oklahoma, Spring 2007.
- “Hyperbolic groups that fiber in infinitely many ways, Part 1 and 2”, Student Topology Seminar at the Department of Mathematics, University of Oklahoma, Spring 2007.
- “The Sageev Construction, Part 1 and 2”, Geometric Group Theory Seminar, at the Department of Mathematics, University of Oklahoma, Fall 2005.

CONFERENCES
AND
WORKSHOPS
ATTENDED

- Carolina Math Seminar at Lander University, Greenwood SC, March 2019.
- MAA-SE meeting at Lee University, Tennessee, March 2019, (funded by The Citadel Foundation Development Grant).
- MAA-SE meeting at Clemson, South Carolina, March 2018, (funded by The Citadel Foundation Development Grant).
- Carolina Math Seminar, USC Salkahatchie, April 2015.
- South Carolina Junior Academy of Sciences Fall Workshop at The Citadel, November 2014.
- South Carolina Academy of Sciences at Trident Technical College, April 2014.
- ICERM Idea Lab Career Workshop for Early Career Researchers, Brown University Providence, RI, July 2013, (fully funded by ICERM).
- MAA-SE section meeting at Greenville South Carolina, March 2013.
- Carolina Math Seminar, Benedict College, October 2013.
- Carolina Math Seminar, The Citadel, October 2011 and 2012.(I was one of the organizers for these meetings.)
- Carolina Math Seminar, USC Salkahatchie, April 2012.
- Carolina Math Seminar, USC Sumter, September 2011.
- Joint Mathematics Meetings, New Orleans LA, January 2011, (funded by The Citadel Foundation Faculty Development Grant).
- Examples of Groups Workshop at Columbus Ohio, May 2008

- Introductory workshop for Geometric Group Theory, MSRI, Berkely, California, August 2007.
- 2007 Spring Topology and Dynamical Systems, University of Missouri Rolla, April 2007.
- Spring Lecture Series, University of Arkansas Fayetteville, March 2006.
- Geometric and Probabilistic Methods in Group Theory and Dynamical Systems, Texas A & M University, November 2005.

GRANTS

- GenCyber Grant 2022 for hosting two Student Camps on Cybersecurity awareness (Co-PI). (Funding Agencies: NSA, NSF).
- GenCyber Grant 2020 for hosting two Student Camps on Cybersecurity awareness (Co-PI). (Funding Agencies: NSA, NSF), (*Camps postponed until 2021 due to COVID outbreak*).
- GenCyber Grant 2019 and 2018 for hosting Student Camp on Cybersecurity awareness (Co-PI). (Funding Agencies: NSA, NSF).
- The Citadel Foundation Research Grant for 2013 – 2014, 2014 – 2015, 2015 – 2016, 2016–2017, 2017–2018, 2018–2019, 2019–2020, 2020-2021, 2021-2022, 2022-2023.
- New Faculty Research Grant of The Citadel Foundation 2011.
- The Citadel Foundation Presentation Grant, Spring 2011, 2014, 2015.
- The Citadel Foundation Faculty Development Grant, Spring 2011.

SERVICES

Service to the College

- Co-Director of STEM Scholars Program. 2017–2020.
- Chair of School of Science and Mathematics Faculty Research and Development Committee at The Citadel 2016 – 2018.
- Member of the Council of Undergraduate Research at The Citadel. 2016-2019.
- Member of Scholarship Committee. (2019 – present).
- Academic adviser to 6 undergraduate students.
- Member of School of Science and Mathematics Faculty Research and Development Committee at The Citadel 2014 – present.

- Member of the college wide Research Committee at The Citadel 2011 – 2013.

Service to the Department

- Member of Search Committee to hire Mathematics and Statistics faculty.
- Chair of Recruitment Committee of Department of Mathematical Sciences 2019- .
- Chair of CURE committee of Department of Mathematics and Computer Science 2016-2017.
- Member of Recruitment Committee of Department of Mathematics and Computer Science 2017-2018.
- Member of Curriculum Committee for Mathematics at the Department of Math and Computer Science.
- Coordinator of Math 105, Finite Mathematics, Spring 2013 – present.
- Member of Graduate Committee for Mathematics.

Service to the Discipline

- Reviewer for MathSciNet and Guest Referee for Rocky Mountain Journal and Mathematica Slovaca Journal.
- Taught Cryptography to high school and middle school students as part of Citadel Gencyber 2018, 2019, 2021, 2022. (Funding Agencies: NSA, NSF).
- Hosted a high school student mathematics research camp in collaboration with other faculties of department of Mathematical Sciences, Summer 2022.
- Organizer of undergraduate poster session at the annual MAA -SE section meeting, 2017–2019.
- Co-organizer of Math Jeopardy contests for Citadel students, 2011 – present.
- Co-organizer of undergraduate poster session at the MAA -SE section meeting, 2015-2016.
- Math Jeopardy co-coach for the team from The Citadel at the MAA -SE section meeting, 2011 – 2015.
- Judge of undergraduate poster session at the MAA -SE section meeting, 2011, 2013 – 2015.

- Judge of undergraduate presentations at the MAA -SE section meeting, 2011 and 2013.
- Organizer of Carolina Math Seminar, Fall 2010 – present.
- Member of Nominations Committee of MAA -SE section, 2011 – present.

Service to the Community

- Taught Cryptography to high school and middle school students as part of Citadel Gencyber 2018, 2019, 2021, 2022. (Funding Agencies: NSA, NSF).
- Hosted a high school student mathematics research camp in collaboration with faculties of department of Mathematical Sciences, Summer 2022.
- Helped organize Challenge Bowl for high school students at the South Carolina Junior Academy of Sciences Fall Workshop in November 2014.

PROFESSIONAL
EXPERIENCE

- Member of Phi Kappa Phi Honor Society.
- Member of Sigma-Xi, Charleston chapter.
- Member of American Mathematical Society (AMS) and Mathematical Association of America (MAA).
- Helped in the proceedings of Math Day organized annually by the Department of Mathematics, University of Oklahoma, for high school students.
- Taught Mathematics in a high school between 2000 and 2002 in India.