Outstanding Posters for the MAA Student Poster Session at the JMM 2019

Algebra

1. Noetherian Rings with Unusual Prime Ideal Structures.
- **Anya Michaelson** Williams College

Advisor(s): Susan Loepp, Williams College

3. Putting the "k" in Curvature: k-Plane Constant Curvature Conditions
- **Maxine Calle** Reed

  Advisor(s): Corey Dunn, California State University, San Bernardino

6. On Characteristics of Hyperfields Obtained as Quotients of Finite Fields
- **Hahn Lheem** PROMYS
- **Dylan Liu** PROMYS

Advisor(s): Matthew Baker, Georgia Tech

9. Centralizer-like Subgroups Associated with the n-Engel Word Inside of Direct Product Groups
- **Maggie Reardon** University of Wisconsin-Eau Claire

Advisor(s): Dandrielle Lewis, University of Wisconsin-Eau Claire

10. Characterization of Zigzag Inverse Semigroups
- **Jennifer Gensler** California State University, Long Beach
- **Ronen Wdowinski** Rice University

Advisor(s): David Milan, University of Texas at Tyler

12. Decomposing Permutations from Young Tableaux
- **Christopher Koch** Butler University

Advisor(s): Amber Russell, Butler University

13. The Commuting Graph of Semi-direct Products of Cyclic Groups
- **Maria Diaz** California State University, Fresno
- **Yuliana Segura** California State University, Fresno

Advisor(s): Oscar Vega, California State University, Fresno

15. Numerical Range of Toeplitz Matrices over Finite Fields
- **Maddi Guillaume** Taylor University
- **Amish Mishra** Taylor University

Advisor(s): Derek Thompson, Taylor University

16. Solutions to Matrix Equation $X_2AX D AXA$ Over Finite Fields of Prime Order
- **Saroj Niraula** Caldwell University

Advisor(s): Aihua Li, Montclair State University

18. The splitting criterion in the hyperoctahedral group and other results on conjugacy classes
- **McKenzie Scanlan** University of Wisconsin-Eau Claire

Advisor(s): aBa Mbirika, University of Wisconsin-Eau Claire

19. Transplanting Trees: Chromatic Symmetric Function Results through the Group Algebra of S_n
- **Joshua Kazdan** Stanford
- **Sofia Martinez** University of California Riverside

Advisor(s): Angele Hamel, Laurier University

23. (2,3,7)-Nielsen classes of the Alternating Groups
- **Vincent Noh** Grinnell College
- **George Ge** Grinnell College

Advisor(s): Jennifer Paulhus, Grinnell College

25. Rotational Row-Complete Latin Squares—from Quilts to Sequenceable Groups
- **Zhaopeng Li** Colorado College
- **Jerrell Cockerham** Colorado College

Advisor(s): Beth Malmskog, Colorado College

29. Cohomology Groups of the dual Steenrod Algebra
- **Ryan Kim** MIT PRIMES-USA Program/Thomas Jefferson High School for Science and Technology

Advisor(s): Sanath Devalapurkar, MIT

31. Context Directed Sorting: Robustness and Complexity
- **Leigh Foster** Metropolitan State University of Denver
- **Manaswinee Bezbaruah** University of Minnesota Twin Cities
- **Henry Fessler** Montana State University
- **George Spahn** Brown University

Advisor(s): Marion Scheepers, Boise State University

32. Sandpile Groups of Cayley Graphs of F_{r2}
- **Jiyang Gao** MIT
- **Jared Marx-Kuo** University of Chicago
- **Vaughan McDonald** Harvard University

Advisor(s): Victor Reiner, University of Minnesota

Analysis

34. 2-Filtrations of Recurrently Generated Polynomials
Julie Campos University of New Mexico
Kapil Chandran Princeton University
Young Han Kim Stanford University

Advisor(s): Khang Tran, CSU Fresno

36. An Application of Abel's Method to the Inverse Radon Transform
Alexander Nolte Tufts University
Julie Sherman University of Minnesota - Twin Cities
Joseph David
Advisor(s): **Zair Ibragimov, California State University, Fullerton**

37. Conditions for Lipschitz Continuity on Post-Critically Finite Self-Similar Sets
Anchala Krishnan University of Washington Bothell
Benjamin York Bowdoin College

Advisor(s): Luke Rogers, University of Connecticut

39. The Magnetic Spectrum on the Sierpinski Gasket
Ruoyu Guo Colgate University
Advisor(s): Joe Chen, Colgate University

Applied Mathematics

43. Eliminating Bias in Hong Kong Air Ventilation Assessments
- **Owen Levin** University of Wisconsin

Advisor(s): David Dy, Hong Kong University of Science and Technology

45. Wiener-Hopf Integral Equation Model: Underwater Applications
- **Cole Foster** Roger Williams University

Advisor(s): Yajni Warnapala, Roger Williams University

50. Cellular-Scale Modeling of Oncogenic Proteins
- **Bernardo Hernandez Adame** Massachusetts Institute of Technology
- **Amanda McAdams** Washington University in St. Louis

Advisor(s): Liam Stanton, San Jose State University

51. Donation Record Analysis for Baltimore Humane Society
- **Jennifer Weiler** Towson University

Advisor(s): Alexei Kolesnikov, Towson University

54. Theoretical Nanoparticle Light Scattering
- **Katlyn York** Simpson College
- **Jacob Austin** Simpson College
- **Kaylee grabarkewitz** Simpson College

Advisor(s): Nicolas Rey-Le Lorier, Simpson College

59. Analyzing Rotavirus Using Game Theory
- **Robert Babac** University of Guam

- **Jayson Morales** University of Guam
- **Jacob Aquiningoc** University of Guam

Advisor(s): Hyunju Oh, University of Guam

60. Tensor flattening approaches to estimate lower bound of small matrix multiplication
tensor's border ranks

- **Yu Ma** UC Berkeley

Advisor(s): Olga Holtz, UC Berkeley

64. Monte Carlo Simulation Using Wavelet filtering, Support Vector Regression, and Recurrent Neural Network for American Option Pricing

- **Srihita Mediboina** Stony Brook University
- **Minyang Zhang** UCLA
- **Yinqi Chen** University of Connecticut
- **Tony Lee** Choate Rosemary Hall

Advisor(s): Xiaodi Wang, Western Connecticut State University

66. Gone with the Flu

- **Kristina Rosete** CSU Fullerton
- **Sonali Vyas** CSU Fullerton

Advisor(s): Roberto Soto, CSU Fullerton

67. Statistical Analysis and Geographical Clustering of Arrest Data for Los Angeles County

- **Cameron Hooper** California State University, Fullerton

Advisor(s): David Uminsky, University of San Francisco

68. Modeling Climate Change in Togo, Africa

- **Jacob Englert** Northern Kentucky University

Advisor(s): Andrew Long, Northern Kentucky University

74. Dynamics of the Inextensible Inverted Flag with Piston-Theoretic Forcing Term

- **Varun Gudibanda** Carnegie Mellon University

Advisor(s): Jason Howell, Carnegie Mellon University

77. Detection of Atrial Fibrillation in Electrocardiograms via Persistent Homology-based Features

- **Esteban Escobar** California State Polytechnic University, Pomona

Advisor(s): David Uminsky, University of San Francisco

78. Reconstructing Elastic Grid Structure from Noisy Landmark Points

- **Yuepeng Yang** Carnegie Mellon University

Advisor(s): Dejan Slepev, Carnegie Mellon University

79. Pricing TYVIX Options Using a Risk-Neutralized Historical Distribution

- **Montgomery Fischer** University of Georgia
- **Rajita Chandak** Brown University
- **Jonathan Ladd** Oberlin College
- **Anthony Sisti** University of Connecticut

Advisor(s): Marcel Blais, Worcester Polytechnic Institute

82. Wildfire: A Mathematical Model Analyzing the Effects of Fire Damage

- **Jake Skinner** Dixie State University

Advisor(s): Vinodh Chellamuthu, Dixie State University

85. Comparative Study for the Lane-Emden Equation in Stellar Configuration to its Higher
Order dynamics

- **Breanna Shi** Stetson University
- **Kaitlin Harding** Rochester Institute of Technology, Rochester, NY USA
- **Abbas Rehmani** University of Wisconsin-Madison, WI USA

Advisor(s): Fazal Abbas, Stetson University, DeLand Fl USA

86. The Effect of pH and Aggregation on Anthocyanin Color: A Mathematical and Experimental Analysis

- **Rachael Tindal** Colorado State University

Advisor(s): Patrick Shipman, Colorado State University

88. Modeling Vapor-to-Particle Ammonium Chloride Band Formation

- **Austin Fearn** Colorado State University

Advisor(s): Patrick Shipman, Colorado State University

89. Perceptual Image Hashing of Video

- **Linda Beverly** California State University, East Bay

Advisor(s): Shirley Yap, California State University, East Bay

91. How the application of Particle Swarm Optimization may help in the fight against cancer by using data from time sequences of medical images to determine the efficacy of a cancer treatment

- **Kao-Pu Chang** Virginia Military Institute

Advisor(s): Jessica Libertini, Virginia Military Institute

98. Convex Neural Code in Low Dimensions

- **Zejun Gao** Colby College
- **Shuofeng Xu** Colby College

Advisor(s): Nora Youngs, Colby College

100. Characterizing Uncertainty in Carbon Sources/Sinks using Bayesian Methods

- **Siona Prasad** Thomas Jefferson High School for Science and Technology

Advisor(s): Chinmay Kulkarni, MIT

101. Automatic Classification of Anthropological Bone Samples

- **Pedro Angulo-Umana** University of Minnesota

Advisor(s): Peter Olver, University of Minnesota

103. Quantifying and Managing the Uncertainty in Piecewise-Deterministic Processes

- **April Nellis** University of Maryland, College Park
- **Tristan Reynoso** University of Central Florida

Advisor(s): Alexander Vladimirsky, Cornell University

106. Investigating the Impact of Marijuana Dispensaries on Crime

- **Roberto Hernandez** California State University, Fullerton

Advisor(s): Laura Smith Chowdhury, California State University, Fullerton

108. Threshold optimization in multiple binary classifiers for extreme rare events using predicted positive data

- **Edgar Robles** University of Costa Rica
- **Fatima Zaidouni** University of Rochester

Advisor(s): Aliki Mavromoustaki, University of California, Los Angeles

110. Cartographic Coordinate Conversion for Stellar Navigation

- **Austin Kreulach** University of Arkansas

Advisor(s): Saad Biaz, Auburn University

111. Nonholonomic Motion Planning for Self-Driving Cars

- **Samuel Schmidgall** George Mason University

Advisor(s): Anton Lukyanenko, George Mason University

113. Constrained Optimization Problem with an Application to Folding

- **Jasmine Camero** California State University, Fullerton
- **Erica Ward** California State University, Fullerton

Advisor(s): Nicholas Brubaker, California State University, Fullerton

120. Characterizations of string stability of interconnected automobile systems

- **Matthew Rose** Roger Williams University

Advisor(s): Hasala Senpathy Gallolu Kankanamalage, Roger Williams University

121. A Diffusion Maps Approach to Dimensionality Reduction

- **Aneesh Malhotra** George Mason University

- **Orton Babb** George Mason University

Advisor(s): Tyrus Berry, George Mason University

Biomathematics

122. A Bayesian method for locating breakpoints in time series
- **Amy Pitts** Marist College
- **Kathryn Haglich** Lafayette College
- **Sarah Neitzel** Unity College

Advisor(s): Jeffrey Liebner, Lafayette College

125. A Computational Approach for Constructing an Intracellular Signaling Pathway Mathematical Model with Application to Parkinson's Disease
- **Elizabeth Gilchrist** Roger Williams University
- **Abigail Small** Roger Williams University

Advisor(s): Edward Dougherty, Roger Williams University

126. A Mathematical Approach for Assessing tDCS Efficacy for Post-Traumatic Stress Disorder
- **Abigail Small** Roger Williams University

Advisor(s): Edward Dougherty, Roger Williams University

130. Effects of observation function selection in nonlinear filtering for epidemic models
- **Leah Mitchell** Worcester Polytechnic Institute

Advisor(s): Andrea Arnold, Worcester Polytechnic Institute

131. Theoretical Notions of Ecological Stability and Their Relation to Temporal Variability
- **Chace Covington** Francis Marion University

Advisor(s): Craig Jackson, Ohio Wesleyan University

136. Oyster population dynamics: a stage-structured differential equation model of interacting reefs
- **Rachel Wilson** The College of William and Mary

Advisor(s): Leah Shaw, The College of William and Mary

137. Asymmetric Demographic Models with a Mate-Finding Allee Effect
- **Jared Ott** University of Nebraska - Lincoln
- **Elizabeth Anderson** Villanova University
- **Gwyneth Terrett** Taylor University

Advisor(s): Daniel Maxin, Valparaiso University

138. Analyzing the Dynamics of an Inflammatory Response to a Bacterial Infection in Rats
- **Allison Torsey** SUNY College at Buffalo

Advisor(s): Julia Arciero, Indiana University Purdue University Indianapolis

143. A Mathematical Model of West Nile Virus: The Effect of Interaction Between Humans, Mosquitoes, and Birds

- **Noelle West** Dixie State University

Advisor(s): Vinodh Chellamuthu, Dixie State University

145. Ecological Niche Modeling and Risk Assessment of Thousand Cankers Disease

- **Benjamin Reber** Houghton College
- **Brianna Alred** University of Tennessee, Knoxville

Advisor(s): Mona Papes, University of Tennessee, Knoxville

146. Modeling Networks of Evolving Populations

- **Sean Elliot** MIT PRIMES

Advisor(s): Dominic Skinner, MIT

149. Partial Least Squares Analysis of fMRI Brain Scans

- **Kaila DeChristofaro** Slippery Rock University
- **Jessica Lefler** Slippery Rock University
- **Rebecca Himes** Slippery Rock University

Advisor(s): Dil Singhabahu, Slippery Rock University

153. Modeling of the Growth of Chlorella vulgaris with Respect to Manganese Dosage

- **Annabella Pauley** Marshall University

Advisor(s): Anna Mummert, Marshall University

155. An Agent Based Model for the Dynamics of HPV with the Integration of Vaccination

- **Stefano Chiaradonna** Benedictine University

Advisor(s): Timothy Comar, Benedictine University

156. Hypothesizing Directionally Dependent Neurons through a Computational Model of the Primary Visual Cortex

- **Harrison Tuckman** College of William and Mary

Advisor(s): Mainak Patel, College of William and Mary

157. Controlling Foodbourne Infections in Lettuce: Testing and Cleaning Methods for Curbing the Spread of E. coli O157:H7

- **Emily Dorn** Olivet College

Advisor(s): Baojun Song, Montclair State University

Computational Biology

162. A Semi-Supervised Dimensionality Reduction Method to Reduce Batch Effects in Genomic Data

- **Anusha Murali** Bishop Brady High School

Advisor(s): Mahmoud Ghandi, Broad Institute

Combinatorics

163. Simplicial Complexes of Zero-Sumfree Sets
- **Ashleigh Adams** University of Minnesota Twin Cities
- **Carole Hall** University of Minnesota Twin Cities

Advisor(s): Kaisa Taipale, University of Minnesota Twin Cities

164. Conjecture O holds for some Horospherical Varieties of Picard Rank 1
- **Lela Bones** Salisbury University
- **Garrett Fowler** Salisbury University

Advisor(s): Ryan Shifler, Salisbury University

165. Asymptotics of Visibility in n-Dimensional Grid Worlds
- **Srinivasan Sathiamurthy** Lexington High School
- **Ezra Erives** Lexington High School

Advisor(s): Zarathustra Brady, MIT

168. The Combinatorics of Splitting and Splittable Families
- **Hao-Tong Yan** Swarthmore College
- **Bryce Frederickson** Utah State University
- **Samuel Mathers** Princeton University

Advisor(s): Samuel Coskey, Boise State University

170. Stirling Numbers for Sunflower Graphs
- **Jose Garcia** Grand Valley State University
- **Page Wilson** Grand Valley State University
- **Matt Phad** Grand Valley State University
- **Jessica Longo** Grand Valley State University

Advisor(s): Lauren Keough, Grand Valley State University

171. Wide and Latin Partitions
- **Carol Yaracz** King's College

Advisor(s): Janine Janoski, King's College

173. Determinant formulas for counting linear extensions of tree posets
- **Stefan Grosser** University of Massachusetts at Amherst

Advisor(s): Alejandro Morales, University of Massachusetts at Amherst

174. The minimum permanent of doubly-stochastic matrices with restricted positions
- **Wilson Wang** University of Massachusetts Amherst

Advisor(s): Alejandro Morales, University of Massachusetts Amherst

178. Unavoidable colorful patterns
- **Alp M̈uyesser** Carnegie Mellon University

Advisor(s): Wesley Pegden, Carnegie Mellon University

180. Anti-van der Waerden results for $x_1 C x_2 D kx_3$ in Z_n

- **Erin Bevilacqua** Penn State
- **Samuel King** University of Rochester
- **Suzannah Tebon** Beloit College

Advisor(s): Michael Young, Iowa State University

183. Multicolor Ramsey Numbers for Small Hypergraphs

- **Emily Zhu** Carnegie Mellon University

Advisor(s): Tom Bohman, Carnegie Mellon University

186. Cyclic Sieving for Cyclic Codes

- **Shruthi Sridhar** Princeton University

Advisor(s): Victor Reiner, University of Minnesota - Twin Cities

187. Maximizing the number of vertices of the d-cube that can be covered by a ball of given radius

- **Oliver Meldrum** Oberlin College

Advisor(s): Dezso Miklos, Renyi Intstitute

188. Special Configurations in Anchored Rectangle Packings

- **Vincent Bian** Poolesville High School

Advisor(s): Tanya Khovanova, Massachusetts Institute of Technology

191. Unique rectification in d-complete posets: towards the K-theory of Kac-Moody flag varieties

- **Michael Zlatin** Rutgers University - New Brunswick

Advisor(s): Oliver Pechenik, University of Michigan

192. On the Okounkov-Olshanski formula for the number of tableaux of skew shapes

- **Daniel Zhu** Montgomery Blair High School

Advisor(s): Alejandro Morales, UMass Amherst

Computational Mathematics

196. Applying Q-Learning to Algorithmic Bitcoin Trading

- **Katherine Thai** Rutgers University

Advisor(s): Queenie Lee, Hong Kong University of Science and Technology

199. Analyzing the Performance of Sublinear CoSaMP

- **Simon Miller** Oakland University
- **Jaya Blanchard** Bowdoin College

Advisor(s): Mark Iwen, Michigan State University

202. Matrix Sparsification for Finding Alternative Basis Matrix Multiplication Algorithms

- **Nathan Cheng** University of California, Berkeley

Advisor(s): Olga Holtz, University of California, Berkeley

205. The Role of Tortuosity in Filtration Efficiency
- **Ivan Mitevski** Columbia University
- **Ines Vujkovac** New Jersey Institute of Technology
- **Matthew Illingworth** New Jersey Institute of Technology

Advisor(s): Ian Griffiths, Oxford University

206. Fast and Stable Multivariate Numerical Rootfinding
- **Suzanna Stephenson** Brigham Young University
- **Erik Parkinson** Brigham Young University
- **Natalie Larsen** Brigham Young University
- **Tyler Moncur** Brigham Young University
- **Hayden Ringer** Brigham Young University

Advisor(s): Tyler Jarvis, Brigham Young University

208. Graph Based Algorithms for Non-negative Matrix Factorization
- **Nitya Raju** Carnegie Mellon University

Advisor(s): Jason Howell, Carnegie Mellon University

211. Parallel Deterministic Frames for Compressed Sensing
- **David Neill Asanza** Grinnell College

Advisor(s): Jeff Blanchard, Grinnell College

213. Automatic Monte Carlo Methods for Bayesian Inference
- **Noah Grudowski** Illinois Institute of Technology

Advisor(s): Fred Hickernell, Illinois Institute of Technology

214. TActIC: Tanh Activations in Image Classification
- **Heyley Gatewood** Stetson University
- **Samuel Hood** Morehouse College
- **Jonathon Scott** Macalester College

Advisor(s): David Uminsky, University of San Francisco

Differential Equations

218. Extension of Bass Diffusion Model
- **Nils Lehmann** Rollins College

Advisor(s): Zeynep Teymuroglu, Rollins College

221. Breather Soliton Interactions for the Quaternionic KdV Equation
- **John Cobb** College of Charleston

Advisor(s): Alex Kasman, College of Charleston

224. Comparison of the Effects of Mixed Delay/Instantaneous Terms on the Frequency of Delay Oscillator
- **Kalsang Sherpa** Trinity College

Advisor(s): Lauren Lazarus, Trinity College

225. Global Solution to a Non-linear Wave Equation of Liquid Crystal in the Constant Electric Field

- **Linjun Huang** UC Davis

Advisor(s): Qingtian Zhang, UC Davis

226. Stable Annulus Solution for the Diblock Copolymer Equation

- **Micheal Belete** George Mason University

Advisor(s): Thomas Wanner, George Mason University

227. Dynamics of a Stage-Structured Population Model with Allee Effect and Asymmetric Dispersal

- **Peter Psathas** College of William and Mary

Advisor(s): Leah Shaw, College of William and Mary

230. Dynamical Models of Early Shoot Growth

- **Michael Zhang** Wartburg College
- **Tomas Bryan** University of Houston

Advisor(s): Sergiy Koshkin, University of Houston

Dynamical Systems

231. Partial Results in the Nivat Conjecture

- **Eben Blaisdell** Bucknell University

Advisor(s): Van Cyr, Bucknell University

232. Decomposition of Nonlinear System Dynamics into Multiple Time Scales

- **Ryan Chakmak** Claremont McKenna College
- **Colleen Chan** Yale University
- **Gal Dimand** University of Redlands
- **Aaron George** University of Maryland

Advisor(s): Claudia Falcon, University of California, Los Angeles

233. Graph Replacement Systems for Julia Sets of Quadratic Polynomials

- **Yuan Liu** Bard College

Advisor(s): James Belk, University of St. Andrews

235. Non-Rigid Rank-One Infinite Measures on the Circle

- **Hindy Drillick** Stony Brook University
- **Alonso Espinosa-Dominguez** Massachusetts Institute of Technology
- **Jennifer N. Jones-Baro** Universidad de Guanajuato/CIMAT
- **James Leng** University of California, Berkeley
- **Yelena Mandelshtam** Stanford University

Advisor(s): Cesar Silva, Williams College

238. Piecewise Translations on a Symmetrically Partitioned Plane

- **Jaaziel Lopez de la Luz** University of California, Irvine

Advisor(s): Anton *Gorodetski, University of California, Irvine*

240. Hyperbolic Julia and Mandelbrot Sets
- **Aaron Shukert** Colorado State University

Advisor(s): Patrick Shipman, Colorado State University

241. Models on the unit square of the Chac´ on, Pascal, and other cutting and stacking transformations
- **Jennifer N. Jones-Baro** Universidad de Guanajuato/CIMAT
- **Hindy Drillick** Stony Brook University
- **Alonso Espinosa-Dominguez** Massachusetts Institute of Technology
- **James Leng** University of California, Berkeley
- **Yelena Mandelshtam** Stanford University

Advisor(s): Csar E. Silva, Williams College

Geometry

246. Intersections of Shortest Taxicab Paths in the Sierpi´nski Carpet
- **Rebekah Chase** Evangel University
- **Ryan Mike** CU Boulder
- **Laura Seaberg** Haverford College

Advisor(s): Carl Hammarsten, Lafayette College

247. Equi-areal Clairaut Parametrizations of Surfaces in Real 3-Space
- **Elena Wang** College of the Holy Cross

Advisor(s): Andrew Hwang, College of the Holy Cross

250. All Tangled Up
- **Seth Colbert-Pollack** Kenyon College
- **Micah Fisher** Kenyon College

Advisor(s): Carol Schumacher, Kenyon College

Graph Theory

255. Exploring Maximum Proper Diameter of Graphs
- **Grant Fickes** Kutztown University of Pennsylvania
- **Dylan Green** Trevecca Nazarene University
- **Nathaniel Sauerberg** Carleton College
- **Jill Stifano** Fairfield University

Advisor(s): Karen McCready, King's College

257. Hall t-Chromatic Spectra and Weak Hall t-Chromatic Spectra of the Petersen Graph and of Wheels with Odd Numbers of Spokes
- **Sophia Aiken** Colorado College

Advisor(s): Peter Johnson, Auburn University

258. Minimal Embedding Dimensions of Rectangle k-Visibility Graphs

- **Espen Slettnes** University of California, Berkeley

Advisor(s): Jesse Geneson, Iowa State University

260. Constructing Copoint Graphs of Convex Geometries

- **Sierra Knavel** Ohio University
- **Giana Cirulli** Eastern University

Advisor(s): Jonathan Beagley, Valparaiso University

262. The coloring graph of complete graphs and Paley graphs

- **Haylee Harris** CSU Fresno

Advisor(s): Oscar Vega, CSU Fresno

263. Failed Power Domination

- **Jonathan Tostado-Marquez** Swarthmore College

Advisor(s): Cheryl Grood, Swarthmore College

267. Coarse Ricci Curvature on Graphs

- **Conor Carroll** California Polytechnic State University, San Luis Obispo
- **Uyen Dinh** California Polytechnic State University, San Luis Obispo
- **Sydney Dye** California Polytechnic State University, San Luis Obispo
- **Joshua Frederick** California Polytechnic State University, San Luis Obispo

Advisor(s): Vincent Bonini, Califonia Polytechnic State University, San Luis Obispo

268. Extremal Problems Related to the Cardinality Redundance of Graphs

- **Daniel McGinnis** New College of Florida

Advisor(s): Nathan Shank, Moravian College

270. Combinatorics of k-Farey Graphs

- **Miguel Lopez** Boston University

Advisor(s): Jonah Gastor, McGill

271. Maximum efficiency, minimum effort: Fastest-mixing Markov chain on (m; n)-star graphs

- **Jacob Williams** University of Wyoming

Advisor(s): Bryan Shader, University of Wyoming

273. Structure Theorem for Critical Groups of Iterated Cones of Graphs

- **Gopal Goel** High school

Advisor(s): David Perkinson, Reed college

275. Graph Theoretic Models of Interdependence in Referendum Elections

- **Colby Brown** University of Arizona

Advisor(s): Jonathan Hodge, Grand Valley State University

276. Failed Zero Forcing on Oriented Graphs: Paths, Cycles and Other Results

- **Alyssa Adams** Youngstown State University

Advisor(s): Bonnie Jacob, Rochester Institute of Technology

Mathematical Education

285. Translating Calculus in the Physical World
- **Faith Hensley** Marshall University

Advisor(s): Bonita Lawrence, Marshall University

286. From PE to Math through Martial Arts
- **Allison Young** Saint Joseph's University

Advisor(s): Tetyana Berezovski, Saint Joseph's University

Number Theory

289. Formulas for Chebotarev densities of Galois extensions of number fields
- **Katharine Woo** Stanford University
- **Naomi Sweeting** University of Chicago

Advisor(s): Ken Ono, Emory University

290. A Formula for the Number of Monic Degree m Polynomials in $F_q.x\bullet$ with Discriminant d
- **Michael Seaman** Caltech

Advisor(s): Zavosh Amir-Khosravi, Caltech

292. On the Characterization of _.n/-Atoms
- **Andre Hernandez-Espiet** University of Puerto Rico - Mayaguez

Advisor(s): Reyes Ortiz-Albino, University of Puerto Rico – Mayaguez

295. p-adic Properties of Hauptmoduln with Applications to Moonshine
- **Ryan Chen** Princeton University
- **Samuel Marks** Princeton University
- **Matthew Tyler** Princeton University

Advisor(s): Ken Ono, Emory University

296. Perfect and Deficient Perfect Numbers
- **Emily Rachfal** Kenyon College

Advisor(s): Judy Holdener, Kenyon College

297. The Supersingularity of Hurwitz Curves
- **Michael Lynch** Colorado State University
- **Seamus Somerstep** Colorado State University

Advisor(s): Rachel Pries, Colorado State University

300. First Moment of Quadratic L-functions in Function Fields
- **Dona Pantova** Macalester College

Advisor(s): Ian Whitehead, Macalester College

302. Asymptotic Bounds for Extended Elliptic Pseudoprimes
- **Dylan Fillmore** University of South Carolina
- **Alice Lin** Princeton University
- **Philip Lamkin** Carnegie Mellon University
- **Calvin Yost-Wolff** Massachusetts Institute of Technology

Advisor(s): Liljana Babinkostova, Boise State University

303. Explicit Sato-Tate for Primes in Arithmetic Progressions
- **Casimir Kothari** Princeton University
- **Trajan Hammonds** Carnegie Mellon University
- **Hunter Wieman** Williams College

Advisor(s): Steven Miller, Williams College

306. Generalizing the Abundancy of an Integer
- **David Luo** Emory University

Advisor(s): David Zureick-Brown, Emory University

308. Effective Bounds for Traces of Maass-Poincar´e Series
- **Havi Ellers** Harvey Mudd College
- **Meagan Kenney** Bard College

Advisor(s): Riad Masri, Texas A&M University

309. Sums of Two Polygonal Numbers in Rings
- **Hongkwon Yi** University of California, Berkeley

Advisor(s): Joshua Harrington, Cedar Crest College

311. The Structure of 'Circular Farey Series'
- **Lee Trent** Rose-Hulman Institute of Technology

Advisor(s): Timothy All, Rose-Hulman Institute of Technology

Numerical Analysis

314. An Adaptive, Highly Accurate and Efficient, Parker-Sochacki Algorithm for Numerical Solution to Large Scale Dynamical Systems
- **Jenna Guenther** James Madison University
- **Morgan Wolf** James Madison University

Advisor(s): Paul Warne, James Madison University

315. Spectrum-Adapted Polynomial Approximation for Matrix Functions
- **Li Fan** Macalester College

Advisor(s): David Shuman, Macalester College

316. Efficiency of a Moving Mesh System with a Curvature-type Monitor and an Application to Burgers' Equation
- **Annaliese Keiser** Bowling Green State University
- **Marianne Debrito** Lawrence Technological University

- **Taima Younes** University of Michigan-Dearborn

Advisor(s): Joan Remski, University of Michigan-Dearborn

319. Fast Convergence with Series Expansion in Riemann Zeta Function

- **Ho Lung Tsui** Exeter College, University of Oxford

Advisor(s): Robert Van Gorder, University of Oxford

Probability and Statistics

324. Utilizing Multilevel Classification to Predict Adverse Drug Effects and Reactions

- **Tori Puhl** Butler University

Advisor(s): Rasitha Jayasekare, Butler University

327. Probabilistic Counting-Out Game on a Line

- **Tingting Ou** Johns Hopkins University
- **Michelle Shu** Johns Hopkins University

Advisor(s): John Wierman, Johns Hopkins University

329. Cluster Analysis of Drugs and their Adverse Effects

- **Brittney Man** Butler University

Advisor(s): Rasitha Jayasekare, Butler University

330. Analyzing Voter Behavior in the Lehigh Valley Through Semi-Parametric Regression and Geostatistical Techniques

- **Benjamin Lieberman** Muhlenberg College

Advisor(s): James Russell, Muhlenberg College

331. A Statistical Analysis of Muhlenberg College's Fourth Down Strategy

- **Luke Wiley** Muhlenberg College

Advisor(s): James Russell, Muhlenberg College

332. A Model For Sequential Processes That Allow for Temporary Setbacks Before Terminating.

- **Zach Hollis** Trine University
- **Dylan Kunce** Trine University

Advisor(s): Daniel Dobbs, Trine University

335. Quantitative and Local Central Limit Theorems

- **Annie Chen** Stanford University
- **Ben Heller** Stanford University
- **Eyob Tsegaye** Stanford University

Advisor(s): George Schaeffer, Stanford University

336. Bayesian Probabilistic Change Point Analysis

- **Rui Qiang** College of the Holy Cross

Advisor(s): Eric Ruggieri, College of the Holy Cross

338. Optimizing the Creditworthiness Threshold of a Bivariate Distribution

- **Victoria Knutson** St. Olaf College

Advisor(s): Hui Gong, Valparaiso University

341. Statistical Analysis and Modeling of Exclusionary Discipline in K–12 California Public Schools

- **Skylyn Irby** University of Mississippi
- **Nathalie Huerta** California State University Channel Islands
- **Cristal Quiones** Pomona College

Advisor(s): Joanna Navarro, University of California Los Angeles

342. Spatial Analysis of Risk Factors Affecting State Rates of Suicide in Young Americans

- **Emely Garcia** Kean University

Advisor(s): Kathryn Cowles, University of Iowa

345. Schur measures and their asymptotic behavior

- **Ahaan Rungta** Massachusetts Institute of Technology (MIT)

Advisor(s): Vadim Gorin, MIT

346. Bayesian Approach to Red Sox Hitters

- **Joshua Clark** The College of the Holy Cross
- **William MacDonald** The College of the Holy Cross

Advisor(s): Eric Ruggieri, The College of the Holy Cross

347. Time to hamstring injury in soccer players

- **Danielle Sebring** California State University, Fullerton

Advisor(s): Valerie Poynor, California State University, Fullerton

348. Algebraic Curve Fitting in R

- **Philip Hossu** Illinois Institute of Technology

Advisor(s): David Kahle, Baylor University

349. Comparing Object Correlation Metrics for Effective Space Traffic Management

- **Julie Zhang** University of Washington

Advisor(s): Minh Pham, UCLA

351. Forecasting Performance Through Analytics

- **Craig Peterson** Dixie State University

Advisor(s): Vinodh Chellamuthu, Dixie State University

Topology

355. Generalized Cell Decompositions of Nested Lorenz Links

- **William Coenen** Wayne State College

Advisor(s): Rolland Trapp, California State University, San Bernardino

356. Equivariant Cut-Paste Operations on Manifolds

- **Ben Riley** University of Kentucky

Advisor(s): Carmen Rovi, Indiana University

360. Trunk of Satellite and Companion Knots

- **Nithin Kavi** none
- **Wendy Wu** None

Advisor(s): Zhenkun Li, MIT

361. Volume of Torus Links

- **Maya Klaib** University of Redlands

Advisor(s): Rolland Trapp, CSUSB

363. Systole Length and Preservation Under Belt-Sums of the Borromean Rings

- **Amanda Cowell** University of Michigan - Dearborn

Advisor(s): Rolland Trapp, California State University, San Bernardino

367. Topological Structure of Reaction Diffusion System

- **DeAndre Johnson** Virginia State University

Advisor(s): Junping Shi, The College of William and Mary

369. Algebraic k-Systems of Curves

- **Max Lahn** Brown University
- **Simran Nayak** Brown University
- **Aisha Mechery** Bryn Mawr College

Advisor(s): Jonah Gaster, McGill University

370. Gordian Adjacency for Positive Braid Knots

- **Sam Serra** University of Colorado Boulder
- **Luke Seaton** Louisiana Tech University

Advisor(s): Katherine Raoux, Michigan State University

371. Automorphisms of the k-curve graph

- **Yassin Chandran** UCSB
- **Roberta Shapiro** Rutgers University
- **John (Rob) Oakley** Concordia University Texas

Advisor(s): Tarik Aougab, Brown University

Other

215. An Investigation of Carmichael Number Sequences

- **Edie Johnson** Riverstone International School
- **Abigail Chen** Boise High School
- **Catherine Ji** Capital High School
- **Andrew Every** Boise High School
- **Mitchell Messerley** Borah High School

Advisor(s): Liljana Babinkostova, Boise State University

281. Belted-Sum Decompositions of Fully Augmented Links

- **Brian Ransom** Florida State University

Advisor(s): Rolland Trapp, California State University at San Bernardino

282. A New Upper Bound on _.n/

- **Gabriel Lopez** Cal State San Bernardino

Advisor(s): Corey Dunn, Cal State San Bernardino

284. The Numerical Range of a Composition Operator on the Hardy Space

- **Laney Bowden** Colorado State University
- **Julia Balukonis** Providence College
- **Fatme Hourani** University of Michigan - Dearborn
- **Ellie Lochner** University of Wisconsin - Eau Claire

Advisor(s): John Clifford, University of Michigan - Dearborn

320. A Mathematical Model of Maximizing Matching Rate Between Students and Advisors

- **Hanmi Zou** College of William and Mary
- **Chengwu Shen** College of William and Mary

Advisor(s): Anke Van Zuylen, College of William and Mary

321. Intelligently Segmenting the Long Tail

- **Carley Maupin** Lewis University

Advisor(s): Amanda Harsy, Lewis University

352. Quantum Singularities in Spherically Symmetric Black Hole Spacetimes

- **Drew Weninger** United States Naval Academy

Advisor(s): Deborah Konkowski, United States Naval Academy