Curriculum Vitae – Marisa Gaetz

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EDUCATION

Massachusetts Institute of Technology　　　　　　　　　　　　　*Sept. 2016 – Present*
Senior Undergraduate (expected graduation May 2020)　　　　　　　　　　GPA: 4.9/5.0
B.S. Mathematics, Minor in Philosophy (in progress)

St. John's Preparatory School (Collegeville, MN)　　　　　　　　　　*2012 – 2016*
High School Diploma and International Baccalaureate Diploma　　　　　　　GPA: 4.0/4.0

RESEARCH INTERESTS

Representation theory, Lie groups and Lie algebras, and algebraic combinatorics.

AWARDS

Alice T. Schafer Mathematics Prize Honorable Mention 2020
MIT ESG Community Service Award 2019
Outstanding Poster Award for the MAA Undergraduate Poster Session at JMM 2017
Saint Cloud Times 2 Under 20 Award 2017
National Merit Scholarship Award 2016
Triple A (Academics, Arts, and Athletics) Region 5A Award 2016

REU PROGRAMS

University of Minnesota - Duluth　　　　　　　　　　　　　　　　　Summer 2018
· Advised by Prof. Joe Gallian.
· Performed both independent and collaborative research in the field of combinatorics on words.

University of Minnesota - Twin Cities　　　　　　　　　　　　　　　Summer 2017
· Mentored by Prof. Pavlo Pylyavsky.
· Collaborated daily with two group members on an algebraic combinatorics problem.

Boise State University　　　　　　　　　　　　　　　　　　　　　Summer 2016
· Mentored by Prof. Marion Scheepers.
· Collaborated daily with two group members and an advisor on an enumerative combinatorics problem.

MENTORED RESEARCH

Massachusetts Institute of Technology　　　　　　　　Spring 2019 – Summer 2019
Representation Theory Research (MIT UROP and UROP+)
· Mentored by Prof. David Vogan (Spring, Summer) and an MIT graduate student (Summer).
· Worked to classify mutually centralizing subgroups of reductive algebraic groups.

Massachusetts Institute of Technology　　　　　　　　　　　　　Spring 2017
Geometry Research (MIT UROP)
· Mentored by Prof. Haynes Miller.
· Worked to classify Euclidean and hyperbolic surfaces.

College of Saint Benedict   Spring 2014 - Spring 2016
Group Theory Research

· Mentored by Prof. Bret Benesh
· Developed winning strategies for a game played on cyclic, dihedral, and nilpotent groups.

RESEARCH PAPERS

Published/Accepted Papers

· M. Gaetz and C. Ji. Enumeration and extensions of word-representants, to appear in *Discrete Appl. Math.* `arXiv:1909.00019`.
· B. Flanagan, M. Gaetz, M. Scheepers, and M. Shanks. Quantifying CDS sortability of permutations by strategic pile size, to appear in *Discrete Math. Algorithms Appl.* `arXiv:1811.11937`
· M. Gaetz, W. Hardt, and S. Sridhar. Support equalities among ribbon Schur functions, *Electron. J. Combin.* **26** (2019) 3, `P3.52`. `arXiv:1709.03011`
· B. Benesh and M. Gaetz. A q-player impartial avoidance game for generating finite groups, *Internat. J. Game Theory* **47** (2018) 2, 451–461. `arXiv:1607.06420`

Submitted/In Progress Papers

· M. Gaetz. Anti-power j-fixes of the Thue-Morse word. `arXiv:1808.01528`.
· M. Gaetz. Dual pairs in complex reductive groups. `arXiv:1910.07592`.

OTHER CONTRIBUTIONS

Online Encyclopedia of Integer Sequences (OEIS) Contributions

· Sequence Entry and Formula: *A281259: Number of elements of S_n with strategic pile of size 6.*
· Formula: *A267324: Number of elements of S_n with strategic pile of size 4.*

PRESENTATIONS

(Upcoming) *Dual Pairs in Complex Reductive Groups*: 10 minute presentation at the Joint Mathematics Meetings, Jan. 2020.

Anti-Power j-Fixes of the Thue-Morse Word: 10 minute presentation at the Joint Mathematics Meetings, Jan. 2019.

Support Equalities Among Ribbon Schur Functions: an Undergraduate Research Experience: 1 hour presentation for Prof. Haynes Miller's *Algebra of Surfaces* Freshman Advising Seminar, Dec. 2018.

Anti-Power j-Fixes of the Thue-Morse Word: 20 minute presentation at the Undergraduate Mathematics Symposium at UIC, Nov. 2018.

Anti-Power j-Fixes of the Thue-Morse Word: 20 minute presentation at the Young Mathematicians Conference, Aug. 2018.

Support Equalities Among Ribbon Schur Functions: poster presentation at the Young Mathematicians Conference, Aug. 2018.

Support Equalities Among Ribbon Schur Functions: poster presentation at the Joint Mathematics Meetings, Jan. 2018.

University of Minnesota REU Final Symposium presentation, Aug. 2017.

Quantifying CDS Sortability of Permutations Using Strategic Piles: poster presentation at the Joint Mathematics Meetings, Jan. 2017.

Quantifying CDS Sortability of Permutations Using Strategic Piles: poster presentation at the Idaho Conference of Undergraduate Research, July 2016.

Boise State University REU Final Symposium presentation, July 2016.

Boise State University REU Interdisciplinary Seminar presentation, July 2016.

COMMUNITY INVOLVEMENT

Member of MIT Math Dept.'s Diversity and Community Building Committee . . . . . Fall 2018 – Present
Staff Member & Social Media Manager of MIT Undergrad. Math Association . . . . . Fall 2017 – Present
Organizer of MIT Student Colloquium for Undergraduates in Mathematics . . . . Fall 2017 – Present
Undergraduate Fellow at The Educational Justice Institute at MIT . . . . Fall 2018 – Present
Co-founder and President of the MIT Prison Education Initiative . . . . Spring 2018 – Present
Organizer of the Summer of HOPE ethics program for court-involved youths . . . . Summer 2019

MENTORING, TEACHING, AND GRADING

Discover Mathematics FPOP Counselor   Fall 2017, 2018, 2019

· Head counselor and organizer for MIT's math Freshman Pre-Orientation Program (2018, 2019), and a counselor for the same program during its inaugural year (2017).

Mathematics Mentor   Summer 2019

· Led a game theory reading course for a talented local high school student.

PRIMES Circle Mentor   Spring 2018, Spring 2019

· Led a game theory reading course for talented students from urban public high schools of Boston.
· Prepared students for a conference presentation and expository paper.

Teaching Assistant for Philosophy Course   Fall 2018, Spring 2019

· TA-ed for Prof. Lee Perlman's *ES.9114 Nonviolence as a Way of Life* course at Boston Pre-Release Center (Fall 2018) and Suffolk County House of Correction (Spring 2019).
· Led students (some from MIT, some incarcerated) in philosophical discussions.

Associate Advisor for Freshman Advising Seminar   Fall 2018

· Helped lead Prof. Haynes Miller's *Algebra of Surfaces* Freshman Advising Seminar.

Math Prize for Girls Grader   Fall 2017, Fall 2018

USA Mathematical Talent Search Grader   Fall 2017

Teaching Assistant for Physics Course   Spring 2017

· Assisted Dr. Tom Peteet's college-level physics course at Mass. Correctional Institution – Norfolk.

Python and Cryptography Tutor   July 2016

· Led a problem solving session for high school students attending a NASA camp.

RELEVANT COURSEWORK AND LEARNING
* indicates graduate course

Coursework 2016-2019

18.725* Algebraic Geometry I (Fall 2019)   18.702 Algebra II
18.745* Lie Groups and Lie Algebras I (Fall 2019)   18.701 Algebra I
18.737* Algebraic Groups   18.103 Fourier Analysis
18.784 Seminar in Number Theory   6.006 Intro. to Algorithms
18.715* Intro. to Representation Theory   18.400 Computability & Complexity
18.705* Intro. to Commutative Algebra   18.100B Real Analysis
18.704 Seminar in Algebra   6.009 Fundamentals of Programming
18.212 Algebraic Combinatorics   18.A07 Geometry of Surfaces
18.152 Intro. to Partial Differential Equations   18.022 Calculus

Graduate Seminar Fall 2019
Seminar on Representations of Real Reductive Groups

· Studying representations of real reductive groups and the Atlas of Lie Groups and Representations Software in a seminar led by Prof. David Vogan (not for credit).

Directed Reading Jan. 2019
MIT Directed Reading Project (DRP)

· Studied Lie algebras and representation theory under the direction of an MIT graduate student.

LANGUAGES

· **Programming/Markup**: LaTeX, Python, C, C++, HTML, CSS
· **Written/Spoken**: English (fluent), Mandarin Chinese (intermediate)