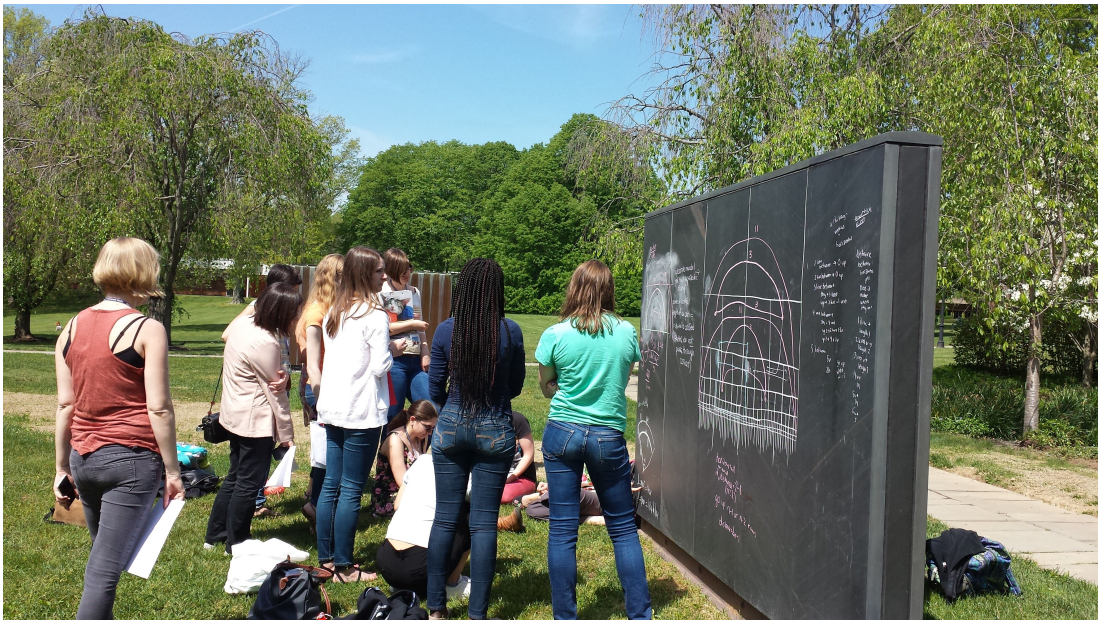
WAM 2016 Yearbook
Curves, Loops, and Words in Geometry

Objectives: This is a compilation of activities and resources contributed by participants during the Women and Mathematics Program May 9 – 20, 2016. We hope this can serve as a mathematical and professional reference guide for women mathematicians around the country.

1 Mathematical Content and References

1.1 Moira Chas on *Computer Driven Questions and Theorems in Geometry*

- Lecture Notes:
  Day 1 & 2, Day 3, Day 4.
- Lecture Videos:
  Day 2, Day 3, Day 4.
- Exercises: Review Session Problems, and Figures



- References:
  a) *Topology of Surfaces* by L. Christine Kinsey, 1993.
  b) *Beginning Topology* by Sue Goodman, 2005.
  c) *Low-Dimensional Geometry: from Euclidean Surfaces to Hyperbolic Knots* by Francis Bonahon, 2009.
  d) *A Primer on Mapping Class Groups* by Benson Farb and Dan Margalit, 2011.
  e) *Mostly Surfaces* by Richard Schwartz, 2011.
  f) *Relations between Word Length, Hyperbolic Length and Self-Intersection Number of Curves on Surfaces* by Moira Chas, 2015.
  g) *The Goldman Bracket and the Intersection of Curves on Surfaces* by Moira Chas, 2015.
  h) *An Invitation to Topology: Curves and Surfaces* by Moira Chas.
  i) Hitchin's notes on *Geometry of Surfaces* Chapters 1 & 4.
  j) Moira Chas' Women and Math page
- Mathematics of Crochet:
  a) Ideas about curvature and computing curvature of crocheted hyperbolic planes by Tony Phillips.
  b) *Crocheing the Hyperbolic Plane* by David Henderson and Daina Taimina, 2001.

1.2 Moon Duchin on *Counting and Growth*

- Lecture Notes:
  Counting in Groups: Fine Asymptotic Geometry

- Lecture Videos:
  Day 2, Day 3, Day 4.

- Exercises:
  Review Session Problems

- References:

  a) *generatingfunctionology* by Herbert Wilf, 1994.

  b) *Topics in Geometric Group Theory* by Pierre de la Harpe, 2000.

  c) *How Groups Grow* by Avinoam Mann, 2012.

1.3 Nancy Hingston on *Closed Geodesics on Surfaces*

- Lecture Notes:
  Day 1 & 2, Day 3 & 4.

- Lecture Videos:
  Day 1, Day 2, Day 3.

- Exercises:
  Curves and Surfaces Problems with Figures, Geodesic Problems.

- References:

  a) Linear Algebra Review

b) *Morse Theory* by John Milnor, 1963.

c) *Riemannian Geometry* by Wilhelm Klingenberg, 1995.

d) *Morse Theory, Closed Geodesics, and the Homology of Free Loop Spaces* by Alexandru Oancea, 2014.

1.4 Nathalie Wahl on *Structures on the Free Loop Space*

- Lecture Notes:
  Day 1, Day 2, Day 3, Day 4.
- Lecture Videos:
  Day 1, Day 2, Day 4.
- Exercises:
  Day 1, Day 2, Day 3.
- References:

  a) *Cyclic Homology* by Jean-Louis Loday, 1998.

  b) *String Topology and Cyclic Homology* by Ralph Cohen, Kathryn Hess, and Alexander Voronov, 2006.

  c) *Introducting Homology*

1.5 Other lectures on video

- *Working with the Square Model of Random Groups* by Yen Duong
- *Some Elementary Remarks about Closed Complex Manifolds* by Dennis Sullivan.

2 Women in Science Seminar and References

2.1 Chats

- *How to Become a Liberated Mathematician in 13 Painful Years* by Piper Harron

- *Overlapping Identities* by Piper Harron, Moon Duchin, and Yen Duong: There's lots of talk of professional development in math, which amounts to gradually getting more comfortable taking on an identity as a "mathematician" and negotiating the social worlds that come with that. Being a woman and a mathematician causes some complicated overlaps, and many of us have other identities to negotiate as well—some of us are parents, queers, people of color, first-generation students, and so on. This conversation is about navigating the intersections of our multiple personal and professional identities.

    a) Identity: family background, sexuality, gender identification, race, ethnicity, geographic location, mental health, mobility.

    b) Environment: how can we make a good culture in math, support/resources for students, role models, pressure from peers/program. What makes a toxic or bad environment? humiliation, neglect...

    c) Normal: what it means, what it means to not be normal, connecting the first two things (aka being the only person with some identity in an environment)

    d) Career: "jobs for women", filling a quota, self-segregation.

2.2 Panels

- *Careers in Mathematics, from Academia to Industry* by Lisa Carbone, Cindy Curtis, Helen Moore, Jo Nelson, Linda Ness, and Ana Rita Pires:

    a) *Research in Industry: A Great Career Choice* by Jack Leeming, 2016.

b) *SIAM's Guide to Careers in Applied Mathematics.*

c) `https://versatilephd.com/`

d) *Free Webinars on Disease Modeling.*

- *Becoming an Academic Mathematician: Transitioning from Undergrad to Grad Student* by Lisa Traynor and Erica Graham:

a) *GRE Advice for Graduate School Applicants.*

b) *Annotated Bibliography on GRE and Its Predictive Validity for Graduate Student Success.*

- *Becoming an Academic Mathematician: Transitioning from Undergrad to Grad Student* by Katrin Wehrheim:

(a) *Finding a Postdoctoral Position in Mathematics* by Lauren Williams.

(b) *Tips for Writing a Research Proposal* by Katrin Wehrheim.

2.3 Research Network

- *AWM Research Collaboration Conferences for Women*
- *Microsoft Research funded Research Collaboration Conferences for Women*

2.4 Travel Grants

- *AMS Travel Grant Programs*
- *AWM Travel Grant Programs*
- *AWM-NSF Travel Grants*
- *IAS Child Care Fund for Women and Mathematics Participants*

2.5 Career Development

- *AMS Career Advice*
- *AWM Career Advice*
- *AWM Career Advice for Students*

2.6 Literature on Gender Issues in STEM

- Annotated bibliography of work related to gender in science by Greg Martin.
- Imposter Syndrome:
  a) *Unmasking the Imposter* by Karen Kaplan, 2009.
  b) *Power Posing: Brief Nonverbal Displays Affect Neuroendocrine Levels and Risk Tolerance* by Dana Carney, Amy Cuddy, Andy Yap, 2010.
  c) *Your Body Language Shapes Who You Are* by Amy Cuddy, 2012.
  d) *What Am I Doing Here?* by Athene Donald, 2012.
  e) *Getting Away with It* by Athene Donald, 2014.
  f) Geek Feminism Wiki
- Stereotype Threat:
  a) *Some Effects of Proportions on Group Life: Skewed Sex Ratios and Responses to Token Women* by Rosabeth Moss Kanter, 1977.
  b) *What's Good for the Goose Is Not Good for the Gander: Solo Status as an Obstacle to Occupational Achievement for Males and Females* by Jennifer Crocker and Kathleen McGraw, 1984.

c) *Memory Deficits and Memory Surfeits: Differential Cognitive Consequences of Tokenism for Tokens and Observers* by Charles Lord and Delia Saenz, 1985.

d) *Half a Minute: Predicting Teacher Evaluations from Thin Slices of Nonverbal Behavior and Physical Attractivemess*by Nalini Ambady and Robert Rosenthal, 1993.

e) *Stereotype Threat and the Intellectual Test Performance of African Americans* by Claude Steele and Joshua Aronson, 1995.

f) *The Effects of Proportional Representation and Gender Orientation of the Task on Emergent Leadership Behavior in Mixed-Gender Work Groups* by Leonard Karakowsky and Jacob Siegel, 1999.

g) *A Threatening Intellectual Environment: Why Females Are Susceptible to Experiencing Problem-Solving Deficits in the Presence of Males* by Michael Inzlicht and Talia Ben-Zeev, 2000.

h) *Solo Status, Stereotype Threat, and Performance Experiences: Their Effects on WOmen's Performance* by Denis Sekaquaptewa and Mischa Thompson, 2003.

i) *Stereotype Threat, Inquiring About Test Takers' Ethnicity and Gender, and Standardized Test Performance* by Lawrence Stricker and William Ward, 2006.

j) *Stereotype Threat in Applied Settings Re-Examined* by Kelly Danaher and Christian Crandall, 2008.

k) *Problems in the Pipeline: Stereotype Threat and Women's Achievement in High-Level Math courses* by Catherine Good, Joshua Aronson, and Jayne Ann Harder, 2008.

l) *Fail or Flourish? Cognitive Appraisal Moderates the Effect of Solo Status on Performance* by Judith White, 2008.

m) *Female Teachers' Math Anxiety Affects Girls' Math Achievement* by Sian Beilock, Elizabeth Gunderson, Gerardo Ramirez, and Susan Levine, 2010.

n) *Sex and Science: How Professor Gender Perpetuates the Gender Gap* by Scott Carrell, Marianne Page, and James West, 2010.

o) *Bias Persists for Women of Science, a Study Finds* by Kenneth Chang, 2012.

p) *Science Faculty's Subtle Gender Biases Favor Male Students* by Corinne Moss-Racusin, John Dovidio, Victoria Brescoll, Mark Graham, and Jo Handelsman, 2012.

q) *Sexist Attitudes: Most of Us Are Biased* by Jennifer Raymond, 2013.

r) *Expectation of Brilliance Underlie Gender Distributions across Academic Disciplines* by Sarah-Jane Leslie, Andrei Cimpian, Meredith Meyer, and Edward Freeland, 2015.

s) ReducingStereotypeThreat.org

t) First woman to run the Boston Marathon

- Combating Gender Bias:

a) *Why So Slow? The Advancement of Women* by Virginia Valian, 1999.

b) *Reducing the Racial Achievement Gap: a Social-Psychological Intervention* by Geoffrey Cohen, Julio Garcia, Nancy Apfel, and Allison Master, 2006.

c) *White Privilege: An Account to Spend* by Peggy McIntosh, 2009.

d) *Reducing the Gender Achievement Gap in College Science: a Classroom Study of Values Affirmation* by Akira Miyake, Lauren Kost-Smith, Noah Finkelstein, Steven Pollock, Geoffrey Cohen, and Tiffany Ito, 2010.

e) *Debunking Myths about Gender and Mathematics Performance* by Jonathan Kane and Janet Mertz, 2012.

f) *Unconscious Bias* by Caroline Simpson, 2012.

g) *Research Policy: Only Wholesale Reform Will Bring Equality* by Brigitte Mühlenbruch and Maren Jochimsen, 2013.

h) *Practical Policies Can Combat Gender Inequality* by Douglas Hilton, 2015.

i) *Avoiding Gender Bias in Reference Writing*

j) `https://implicit.harvard.edu/implicit/`

- Sexual Harassment in the Sciences:

a) *Sexual Harrassment Case Shines Lights on Science's Dark Secret* by Michaeleen Doucleff, 2015.

b) *The Shifting Tide of Sexual Harassment in Science* by Rachel Feltman, 2016.

c) *How to Stop the Sexual Harassment of Women in Science: Reboot the System* by Zuleylka Zevallos, 2016.

2.7 Women Leaders in Business

Math in the Real World: More Than Just a Numbers Game by Sandi Peterson, Group Worldwide Chairwoman, Johnson & Johnson; and Kathy Wengel, Worldwide Vice President, Johnson & Johnson Supply Chain.

2.8 Alicia Boole

a) *The Mathematical Visions of Alicia Boole* by Moira Chas

b) *The Princess of Polytopia: Alicia Boole and the 120-Cell* by Tony Phillips

2.9 Emmy Noether

Emmy Noether Celebration:

a) *Emmy Noether: Breathtaking Mathematics* by Georgia Benkart.

b) *Symmetry and Conservation Law: Noether's Contribution to Physics* by Karen Uhlenbeck.

c) *Emmy Noether Lecturer Plaquette commissioned the by International Mathematical Union* by Stephanie Magdziak.

3 Outreach Efforts

- Be a Mentor/Role Model: "When you're feeling sorry for yourself, taking care of someone or something else, evan a house plant", Banana Yoshimoto.
- Successful Community Outreach Events during WAM 2016 that Can Be Replicated Elsewhere:
  a) Attend a local running race and set up a table to teach local high school students how to cut a bagels (there will be lots of free bagels at any running race) into two linked halves: *Mathematically Correct Breakfast*.

WAM at Princeton5K

b) Show and tell at a local elementary school:

   a) *Betsy Ross Theorem* by Yen Duong, Susan Kemboi, Hannah Turner, and Elizabeth Wicks at Princeton Littlebrook Elementary School Science Expo for 4th and 5th graders.

   b) *Möbius Valentine* by Federica Fanoni, Sarah Mousley, Madeleine Weinstein, and Sunny Xiao at Princeton Littlebrook Elementary School Science Expo for 4th and 5th graders.

c) Other math activities for kids: Mike's Math Page, Julia Robinson Mathematics Festival.

- WAM16 Participant facebook Page.