

Mathworks
TEXAS MATHWORKS
AT TEXAS STATE UNIVERSITY

PROOFPoints

The Mathworks e-newsletter

Mission

To research and develop model programs and self-sustaining learning communities that engage students from all backgrounds in doing mathematics at a high level.

Mathworks is a center for innovation in mathematics education at Texas State University. We research and develop model programs in the following areas:

- Summer Math Programs
- Teacher Professional Development
- Curriculum Research & Development

Support math learning opportunities for all students

Donate online today to the Mathworks Legacy Campaign!

Mathworks

Max Warshauer, Director
Terry McCabe, Associate

Mathworks Newsletter

Fall 2020



"Apart, but not alone."

In this Newsletter:

- Thank you to our Donors
- Summer in Review

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Hiroko Warshauer, Research
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○ **Camps**

- JSMCH – Junior Summer Math Camp Half-day, Teacher Professional Development
- JSMCR - Junior Summer Math Camp Residential
- HSMC - Honors Summer Math Camp

○ **Research**

- Graduate Student Research Projects
- Faculty Mentor High School Students in Original Research Projects
- Dr. Alex White recognized for math models to end Covid19

- Mathworks Math Contest
- 2021 Summer Camps Dates Announcements (Applications open in January)

Thank you to all of our Donors

Giving comes in a variety of forms: time, talent, services, and funds. Our faculty give their time and talent to making sure their lessons are clear, helpful, fun and engaging. Our counselors work hard to make every camper feel comfortable, valued, and supported at every turn. Mentors have worked tirelessly to guide students in their research endeavors. We can safely say that everyone involved in the Mathworks programs have given of themselves in one way or another. Thank you all for your dedication.

Along with these gifts, we are especially thankful for the donations from individuals, businesses, partners, and alumni. With the financial support of these groups, we would not be able to conduct the Mathworks programs. Thank you to all our donors:

American Math Society Epsilon Fund

Sarah and Ernest Butler

FAX: (512) 245-1469

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Forward this email to friends and family.

Dear Alumni,

Have you recently...

Moved?

Started graduate school?

Landed a new job?

Written a book?

Received an award?

Or simply want to reconnect with other alumni?

We at Mathworks love to hear what alumni are doing!

Simply fill out this [online update form](#).



A member of the Texas State University System

*Herb Carter
Jeff and Gail Kodosky*

KLE Foundation

RGK Foundation

Harman Sooch Foundation

H-E-B tournament of Champions

Mathworks Alumni

Summer in Review

Junior Summer Math Camp Half-Day ([JSMCH](#)) (2 weeks, June 8 - 19, 2020):

This program is a commuter two-week, multi-level math camp for students in grades 4 - 8. Because of Covid19, this camp was cancelled for summer 2020. Although the students did not get to attend, Mathematics Department faculty members, Cody Patterson, Hiroko Warshauer, and Terry McCabe, worked online with 12 master teachers to discuss the Mathworks Guiding Principles: Doing Mathematics, Persistence, Classroom Culture and Communication, and how these teaching practices are supported in our camps by our curriculum and the teachers. These principles provide a foundation that we use to develop a model math camp environment for learning mathematics at a high level. The project resulted in written material, authored by teachers and faculty for use in future JSMCH classes and professional development.



While we missed having the students each day during the camp, we are pleased to say that this time was critically useful for faculty and teachers to reflect upon Mathworks camp curriculum and practices and to develop new methods and resources for future camps. The 2021 Junior Summer Math Camp is planned for June 7 - 18, 2021. [Applications will be available in January of 2021.](#)

Junior Summer Math Camp - Residential ([JSMCR](#)) (2 weeks, June 7 - 19, 2020):

In early April, we decided to conduct a virtual (online) camp to provide a high-quality environment for students to explore in-depth problem-solving. Despite the new platform and the challenges of conducting camp in a virtual environment, the faculty and counselors went to work to provide a fun environment for middle school students to learn, share, and engage in high-level mathematics and share other talents and interests.

Campers "arrived" on Sunday, June 7th for the first virtual meeting with the entire camp. After everyone introduced themselves, the counselors and students met with fellow campers and their prospective study groups. The goal of the program is to

develop young students as ***creative and critical thinkers***.

Mathematics faculty members, Eugene Curtin, Jian Shen, and Tim Chase met each morning with the students in Zoom classroom environments to teach topics including number theory, geometry, counting, logic, and other problem-solving topics. They nurtured students' interests and abilities to pursue higher-level math through instruction and study group interactions. To maintain the fun environment, the students had free time to meet online and to enjoy sessions on baking, chess, exercise, calligraphy, scavenger hunts, and a t-shirt design project. The counselors provided support and encouragement in creating a Math Camp community. The first week ended with a colloquium, *All the Symmetry You Can Buy for Two Dollars*, given by Cody Patterson. The second week concluded with a talent show where the students showcased various musical talents and other skills.

Details about the camp:

- JSMC-R: June 7 - 19, 2020
- Faculty: 3
- Counselors: 19
- Staff: 3
- Students applied: 161
- Students accepted: 72 middle school students
- Scholarships: 21 students, \$19,100

Student Comments:

"It was also amazing to get to work with other kids who share a love for math. My teacher was also able to explain the problems in ways I could follow easily and understand. I had a lot of fun this summer at Mathworks and hope to come back next year!"

"Canvas took some getting used to at first, but I realized the organization, how everything was already in place for me, and I chose to embrace that. I think submitting work was pretty easy, and for presentations I didn't get the mental burden of having thirty pairs of eyes fixated on me while I was talking, because they were mostly looking at the work being presented."

"This camp helped me develop a new way to see math and it got me a bit closer to what I want to become, an architect. This camp was different from others that I've been to for the other camps bore me to death while this camp was engaging and fun."

Honors Summer Math Camp ([HSMC](#)) (6 weeks, June 21 - August 1, 2020):

The HSMC was also conducted using a virtual platform for an exciting six-week, intensive learning environment for 70 talented students. Using Zoom the students had classes in a virtual classroom, nightly study groups, and free time to meet with faculty, peers, and mentors. The first-year students took Number Theory, which started at 8:30 am each morning taught by Max Warshauer followed by an Honors Seminar class taught by Ellen Robinson. Honors Seminar, where students read *The Five Elements of Effective Thinking*, by Mike Starbird and Ed Burger, connected to the topic discussed during Number Theory. Next the students and counselors had free time to share thoughts, games, talents, and more. At 1:00 pm, the students returned to a Zoom class with Don and Carol Hazlewood where they learned to program using *Mathematica*. Later in the afternoon, the counselors attended a teaching seminar. Meanwhile, the returning students worked on research projects in the mornings in small groups mentored by faculty from Math and Computer Science. They then took afternoon classes in Analysis taught by Tim Chase and Terry McCabe, and Abstract Algebra taught by Eugene Curtin. All of the students attended nightly study

groups led by an incredible group of counselors, working in groups of 3 or 4 students. The study groups provided a setting where the students could work together on problem sets from the courses they were taking. We also had an outstanding group of speakers on a wide variety of topics; and concluding research talks from the returning students. Speakers and topics included:

- June 12, Cody Patterson, *All the Symmetry You Can Buy with Two Dollars*
- June 26, Lisa Lowrance, *My Time at Math Camp and The Five Color Theorem*
- July 3, Mike Starbird, *Doughnuts, Dogs Bones, and Topology*
- July 7, Admiral Bob Inman, *Life Story and the Challenges we Face*
- July 10, Evan Dummit, *Pick's Theorem and Farey Fractions*
- July 17, Kate Melhuish, *A Window into the World of Mathematics Education Research*
- July 18, David Bamberger, short video about Bamberger Ranch Conservation and Stewardship
- July 24, Dan Shapiro, *Integer Sequences and Divisibility*
- July 28, HSMC Presentation of Research Projects
- July 29, HSMC Presentation of Research Projects (continued)
- July 31, Lauren Ancel Meyers, *Modeling to Mitigate the COVID-19 Pandemic*

Camp officially ended on July 31 with a talent show.

However, counselors, second-year, and third-year students will continue to work on the sixteen sixteen different original research projects with their faculty mentors into the fall. Many of these projects will be submitted for publication and/or entered into science and math competitions.

2020 HSMC Research Mentors

- Mentor: Suho Oh; Tableau Stabilization
- Mentor: Shuying Sun; Comparative Analysis of Haplotype Assembly Algorithms
- Mentor: Shuying Sun; BS Co-Methylation Patterns in Breast Cancer Samples
- Mentor: Thomas Keller; Counting Prime Graphs of Finite Solvable Groups
- Mentor: Lucas Rusnak; Generalizing Kirchhoff Laws for Signed Graphs
- Mentor: Lucas Rusnak; An Oriented Hypergraphic approach to Hadamard's Conjectures
- Mentor: Dan Tamir; Simultaneous Compression and Encryption Using Improved Shannon-Fano-Elias Codes
- Mentor: Dan Tamir; Score-based Evaluation of Pseudo-Random Number Generators
- Mentor: Dan Tamir; Parametric Representation of Point Clouds Through Interpolation
- Mentor: Dan Tamir; Computing with Words in Threat Detection Systems
- Mentor: Cody Patterson; Student Definitions of Success at an Informal Math Camp
- Mentor: Alex White; Analysis of the Spread of COVID-19 and Impacts of Mitigation Interventions using Cellular Phone Mobility Data in Jilin, China
- Mentor: Alex White; A Multivariate Analysis of COVID-19 Disparities in 254 Rural vs Urban Counties in Texas using Multiple Linear Regression Models
- Mentor: Alex White; Poisson Process Analysis of Classroom Observation Data
- Mentor: Hiro Lee Tanaka; Determining Explicit Forms and Relationships between Liouville Manifolds

- Mentor: Jelena Tescic; Graph Balancing for Network Data Analysis

Details about camp:

- HSMC: June 21 - August 1, 2020
 - Faculty: 7 (Max, Don, Carol, Ellen, Tim, Terry, Eugene)
 - Counselors: 19
 - Research Mentors: 9
 - Research Projects: 16
 - Staff: 3
 - Students applied: 287
 - Students accepted: 70 high school students
 - 32 First-year
 - 27 Second-year
 - 11 Third-year
 - Scholarships: 15 students, \$39,000

Student comments:

"HSMC has truly allowed me to find another family I belong to, make new friends, all while challenging my math skills and expanding my problem solving skills. I can't imagine how much more amazing camp would be if it were in-person. I really hope that I will have the chance to experience HSMC next year in Texas, and have even more of a blast with everyone!"

"Dr. Meyers may have been the most relevant to me since she talked about modeling viruses which is basically my research project. My favorite activity in the camp was research. At first, it was a little frustrating because we didn't have an exact clear path (sort of hard to find something "new" with COVID). However, Dr. White helped us find a good idea of taking into account spatial movement and is continuing with us after camp. I appreciate his time in helping me and my fellow researchers find something new for COVID."

"Playing social deduction games with my study group quickly became something I looked forward to every day. In lieu of the in person bonding time we would normally have, my group played everything from online One Night Werewolf to Avalon to Spyfall and more. Least favorite part: I miss being in-person and getting to spend 27/7 with all these amazing people. More specifically, I miss the weekend trips."

Research



Graduate student research projects.

Six Texas State graduate students in either the PhD program in mathematics education or a MS program in mathematics (Justin Eccles, Lino Guajardo, Christina Koehne, Josephine Reynes, Jacob Shapiro, and Holly Zolt) worked online with Hiroko Warshauer to develop activities and resources that build on state-adopted school Mathworks curriculum-*Math Explorations*; our *Math Quest*

camp workbooks, and our *Math Reader* and *Math Explorer* publications with problems, activities, and articles for elementary and middle school students. The new activities developed by graduate students will be implemented in the 2021 JSMCH coordinated with related research studies that investigate the effectiveness of tasks, student engagement, and teaching practices. Max and Hiroko will be on Developmental Leave this coming year to continue this work, while piloting and researching the ways that young students can use these out-of-class resources.

Dr. Alex White uses Math Models to Make Inroads Against COVID-19



Taking on COVID-19 has entailed a 3-prong approach from Alex White, a professor of mathematics education and the assistant chair of the Mathematics Department at Texas State University.

White has teamed up with both Mathworks, a center for innovation in mathematics at Texas State, and Lauren Ancel Meyers, a professor of integrative biology at the University of

Texas at Austin, to put some new math models to work. A research group headed by Meyers has been using those models for several years to predict the spread of diseases. Meyers' mathematical models utilize graph theory to model how disease spreads through a contact network, data from public health officials in the U.S. and Canada and computer simulations to design optimal control measures of diseases. [Click here to read more.](#)

Mathworks Math Contest

The Mathworks Math Contest (MMC) is a free contest - an opportunity for middle school students (6-8th grades) to explore mathematics and be challenged by high-level problems.

The MMC is a 15-question test that is proctored by math teacher and coaches at their respective locations. However, due to Covid-19 restrictions, some schools may need to provide a virtual testing environment. In this case, the 2020 MMC may be administered by other individuals such as a parent.

Once all the students have taken the test, they are sent back to Mathworks. The tests are scored, and the scores are released to the teachers and coaches. The MMC is an important part of the selection process used by Mathworks to identify a Mathworks Team for the Primary Math World Competition ([PMWC](#)) that is held annually in Hong Kong.

Timeline for the 2020 [MMC](#):

- **October 28th:** the test **sent via email** to math teachers/coaches or parents. **(If you do not see the test in your inbox please check your spam folder.)**
- **November 4th:** Day of Contest!

- **November 6th:** Tests must be returned to Mathworks, postmarked by this date.
- **November 12th:** Test must be received by Mathworks by this date.
- **December 8th - 12th:** Test scores will be released to teachers/coaches.

The teachers, coaches and/or parents can register through our website. We ask that all proctors register so that we can get a good count of the total number of students and the proctor's email address. Please keep in mind that you will receive the test and notifications from us by email. [Click here to register to proctor the exam.](#)

2021 Camp Dates Announced

Junior Summer Math Camp (half-day)

- June 7 - 18, 2021
- \$400 - Scholarships are available
- A two-week, multi-level program that introduces students (grades 3 - 8) to beginning concepts in algebra through activities, with more advanced levels in problem-solving and discrete math. Students explore problems together and share in the excitement of mathematical exploration and discovery.

Junior Summer Math Camp (Residential)

- June 6 - 19, 2021
- \$1600 - (\$1,000 if online) Scholarships are available
- The two-week, residential program for middle school students challenges students with advanced math problems. The goal of the program is to develop students into *creative and critical thinkers*. We nurture students'

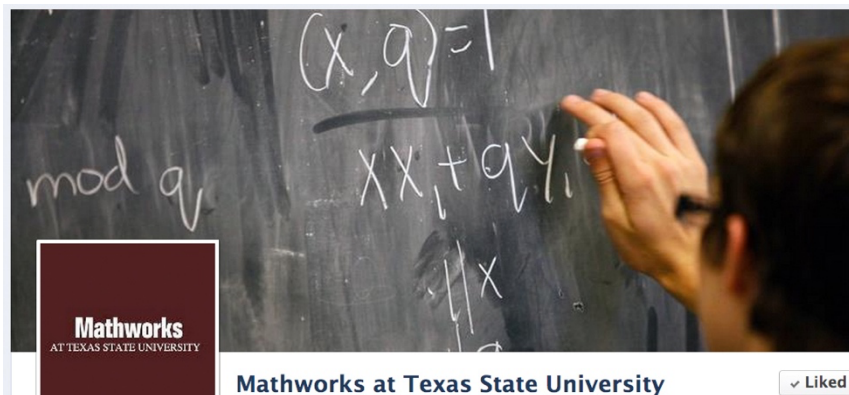
interests and abilities to pursue higher-level math courses and degrees and careers in STEM.

Honors Summer Math Camp (Residential)

- June 20 - July 31, 2021
- \$4800 - (\$3,000 if online) Scholarships are available
- Six-week, intensive multi-summer program for high school students. The goal of the program is to develop talented students from all socioeconomic backgrounds through an in-depth immersion doing mathematics in a unique learning environment.

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