K-12 STEM Center: STEM Community outreach for 45 years

New Faculty Orientation – August 2022

(L:R) Prof. Slaughter, Dean Yortsos, Prof. Ragusa greet two K-12 teachers.
Co-Directors, Darin Gray, Ed.D. (daring@usc.edu) and Katie Mills Ph.D. (kmills@usc.edu)
**Mission:** The K-12 STEM Center is committed to providing equitable, culturally responsive opportunities for youth, families, and schools. Diversity, equity, and inclusion are core values that guide us in our work to actively address systemic inequities in STEM Education and provide programs that build personally relevant knowledge and skills, self efficacy, and leadership within a community of learning and practice.
K-12 STEM Center Lead
Maja Matarić

Co-Directors
Darin Gray, Ed.D.
Katie Mills, Ph.D.

Staff
Mary Bonaparte-Saller, Ph.D.: Elementary STEM
Ben Louie: MESA Director
Jennifer Kolbauer: K-12 student programs
Monica Lopez: High School Research
Alexandra Gutierrez: MESA
Anne Areta: NSBE Jr, Virtual tutoring
Victor Kim: CS@SC
Florence Lee: CS@SC
Lauren Guzman: Finance/Administration

LPL students building rockets with 42nd St school students
Priorities, Programs & Partnerships

Real-world STEM Experiences

Applying STEM concepts

USC students as Ambassadors/Mentors

Meaningful engagement and interaction

Systemic Change

STEM Ecosystem, District Partnerships
Real-world STEM Experiences

L.A. County Racial-Behavioral COVID-19 Modeling

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Windward School, Class of 2022
USC Viterbi Department of Industrial and Systems Engineering, SHINE 2021

Introduction: ISE Lab Work

Work in the Industrial Systems and Engineering Lab spans topics such as chronic diseases, medical decision making, and telemedicine. Recently, Professors Shing Wu and Shieh-Shou Su have been working together on a project that involves modeling COVID-19 in L.A. County to assist health policymakers.

- Professor Su has been developing an innovative mathematical COVID-19 model for the county that considers traffic flow behaviors in geographic areas.
- Professor Wu runs focus group interviews with members of two L.A. communities to understand and quantify differences in behavior for the model.

Goals and Impact of Research

Geographic and Racial Considerations

In my research, I wanted to explore the relationships among race, behavior, and aspects of the pandemic in L.A. County and build a model schematic of COVID-19 for different parts of the county to incorporate these complexities. L.A. County is divided into six service planning areas (SPAs): (1) Antelope Valley; (2) San Bernardino Valley; (3) San Gabriel Valley; (4) Metro L.A.; (5) West L.A.; (6) South L.A.; (7) East L.A.; and (8) South Bay. I chose to view L.A. County at the SPA level because the county observes SPAs from a health standpoint and each SPA captures a unique set of communities in L.A. In addition, I chose to analyze trends for the five most prominent racial groups in the county: Asian (including Pacific Islander), Black, Hispanic, Native, and White (in alphabetical order).

Different SPAs have different racial breakdowns.

Simple and Complex Modeling

To model the pandemic in a manageable way given time constraints, I built an uncalibrated susceptible-infected-recovered (SIR) model based on L.A. County COVID-19 parameters and graphed the spread of the disease over 100 weeks using Insight Maker.

Conclusions and Predictions

Trends in Data

There are behavioral and situational differences among racial groups that correlate with variations in case levels and vaccination rates. Trends may be identified by limited access to resources, free time, and/or vaccines for some races, a higher perceived risk of disease by Asians, a mix of vaccines because of historical distrust, COVID-related misinformation, and more. Potential biases in behavioral survey data include social desirability and the fact that there are only three response options. These biases could explain why trends in mask-wearing data are not as clear as expected given information gleaned from focus groups.

Predicting SPA Behavior

Because each SPA was a different racial breakdown, we hypothesize that the behaviors of each SPA reflect the behaviors of the racial groups that constitute that SPA. One way to predict the general behaviors of each SPA is to take the weighted average of the most recent data across racial groups for each behavior. We can use our findings to inform rates of free in a COVID-19 model.

Reflections and Next Steps

Over the course of SHINE, I learned many useful skills, including reading and searching for scholarly literature, using MATLAB to visualize data and solve problems, and properly following social and behavioral research best practices when handling data involving human subjects. Most of all, I valued learning about the modeling process from the professors and my mentor’s work and discovering pandemic-related trends in L.A. County. In the future, I would love to dive deeper into the mathematical aspect of model schematics by calculating and testing a model with different health policies. I would also like to conduct more research on why certain behavioral trends exist for different races.

Acknowledgements

I am grateful for the support of the USC Viterbi School of Engineering and the faculty who have helped me along the way. I would like to thank my mentor, Professor Shing Wu, for his guidance and support throughout the project. I would also like to acknowledge the contributions of my colleagues and collaborators at the University of Southern California. This work would not have been possible without their dedication and expertise. Finally, I would like to thank the USC Viterbi School of Engineering for providing me with this opportunity to contribute to the field of industrial and systems engineering.
Priorities, Programs, & Partnerships
Priorities, Programs, & Partnerships

- SHINE: Summer High School Intensive in Next-Generation Engineering
- CS@SC Summer Camps
- Project Payload
- ENERGY OF STEM
The K-12 STEM Center has helped the NSF Early Career Award winners of the past few years with their Broader Impacts.
Programs, Projects & Partnerships

Chem Ed Week: Teacher Training on Greenhouse Gases

Teachers will walk away from this interactive session with a proven lesson plan and the ability to engage students with the free 3D molecule modeling software, IQmol, to learn about greenhouse gases.

Free, full lesson plan and training in the software IQmol will be provided Meredith Brandon (Hawthorne Math and Science Academy), Kareaa Kron and Professor Shaama Sharada (both in USC Viterbi Chemical Engineering).

The free training is limited to 25 teachers, and the workshop will be filled on a first-come, first-served basis.

https://viterbik12.usc.edu/chem-ed/

Learning MATLAB & Computational Physics with USC Electrical Engineering Professor

July 9, 2021 / Leave a Comment

Conozca una Ingeniera Aquí!

May 23, 2018

Mariachi music and jazz standards enlivened the multi-school Fair last Saturday sponsored by Los Angeles Unified School District’s Local District East. Families with students attending those schools stopped at many of the Festival’s over 80 booths. [Read more]
https://viterbik12.usc.edu/broader-impacts/

Programs, Projects & Partnerships

STEM PUSH NETWORK

Johnson C. Smith University
Become yourself. Change our world.

STEM ecosystems

NSF INCLUDES National Network
Broadening Participation, Expanding Opportunities in STEM

South Los Angeles Transit Empowerment Zone

LA STEM Collective

NANDC
North Area Neighborhood Development Council

LINKED LEARNING

USC Viterbi
School of Engineering

University of Southern California
## Broader Impacts Pathway

<table>
<thead>
<tr>
<th>2022-23</th>
<th>2023-2024</th>
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<tbody>
<tr>
<td>Tap into STEM Center Event</td>
<td>Identify possible partner school for</td>
<td>Develop relationship with the partner</td>
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<tr>
<td>Speak/Judge</td>
<td>lab tour or speak/judge</td>
<td>school</td>
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<tr>
<td>Join SHINE or other programs</td>
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During the year you submit CAREER proposal:

- **Fall**: brainstorm, STEM Center helps identify partner possibilities, meet Principal or Administrators
- **Spring**: interaction with Partner (lab tour, meet faculty, etc.)
- **May**: ask for a letter of collaboration from STEM Center & Partner Principal