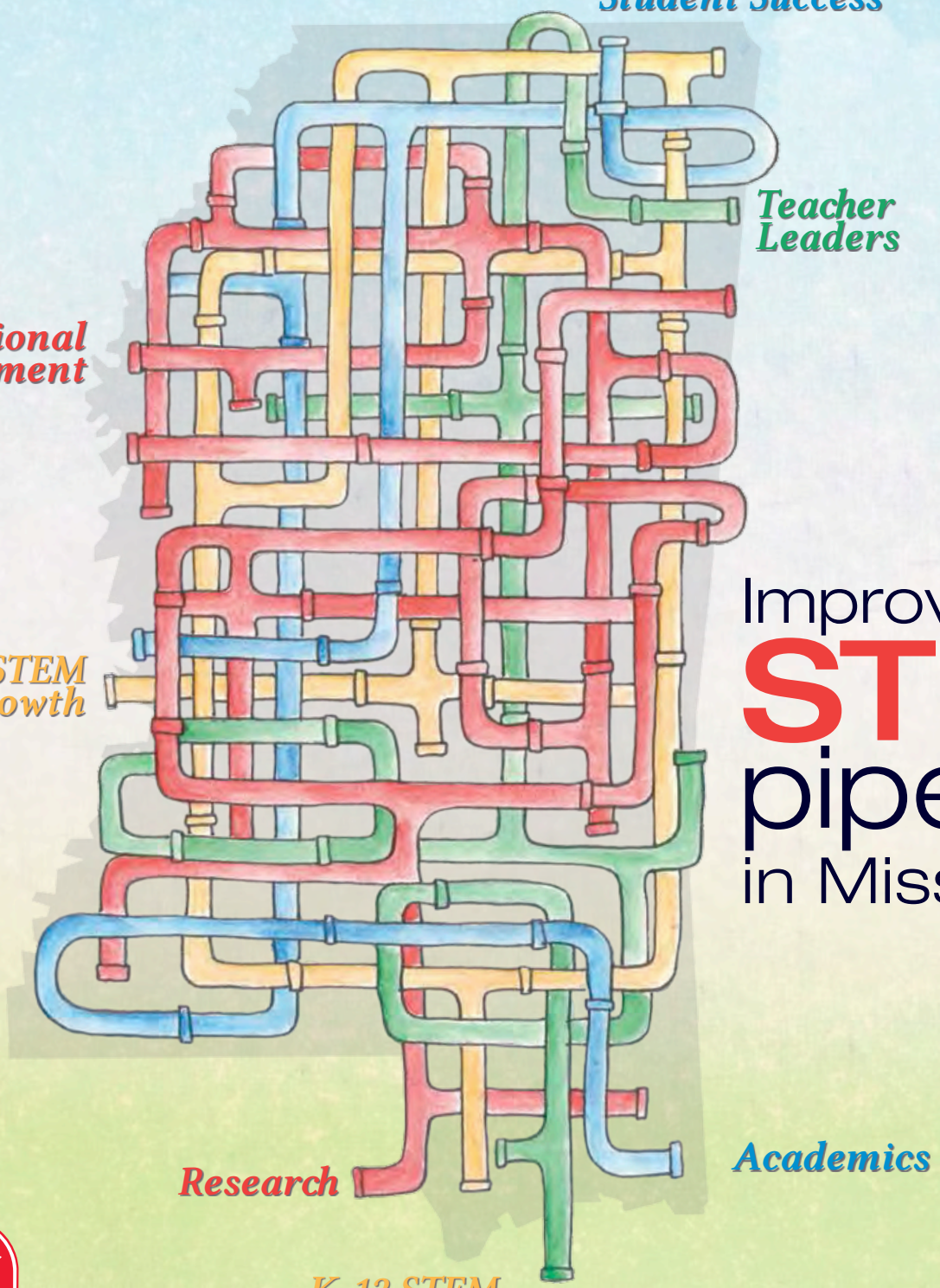
Center for Mathematics & Science Education

est. 2006

2015 SPECIAL REPORT



Improving the STEM pipeline in Mississippi

Center for Mathematics & Science Education

est. 2006

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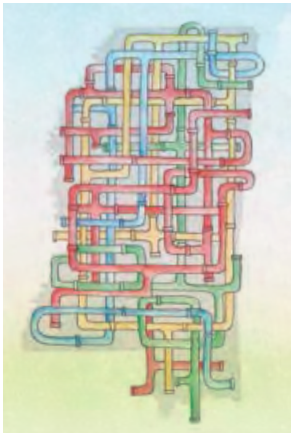
CMSE Mission

The CMSE seeks to improve mathematics and science education in Mississippi by fostering interaction between academic and K-12 education communities; supporting the implementation of research-based methods in the classroom; and promoting interest in science, technology, engineering, and mathematics fields.

Behind the Cover

When considering ideas for the cover of this CMSE Special Report, we envisioned representing the state of Mississippi and how our work directly impacts the "STEM Pipeline." At the CMSE, everything funnels into it. Our four divisions are key entry points. Through academics, we help students obtain success. Through K-12 outreach, we grow excitement for STEM. Through professional development, we help teachers become leaders. And, through research, we help supply knowledge to advance our profession. We strive to improve STEM education every day; it's our priority.



We hope you enjoy this Special Report.

Editorial Staff

Editor: Andrew Abernathy
Designer: John McCustion
Illustrator: Joy Ballard

FROM THE DIRECTORS

Dear Friends,

The CMSE began about 10 years ago as a discussion between Associate Provost Maurice Eftink and myself. We discussed the need for STEM workforce development in Mississippi and the activities that could improve the "STEM pipeline" so more students could be ready to study STEM fields in college. Our vision was to create a center that supported parents, teachers and governmental agencies in our pursuit. We put everything, including the proverbial kitchen sink, in our initial proposal to the Robert M. Hearin Support Foundation.

Today, I've had the privilege of being the CMSE's director for nine years. We've transformed an external investment totaling $6.1 million into innovative programs for students and educators. The vision we established in 2005 remains but our practical outworking is under constant evaluation and evolution. Some efforts we started on day one continue while others have come and gone. Programs we never imagined 10 years ago have come to play a significant role in our mission. As we work with students, teachers, policy makers and organizations around the state, we are constantly asking "How can we do it better?" and "How can we make a bigger difference?" The CMSE continues to promote the quality and quantity of Mississippi STEM workforce.

John O'Haver, Ph.D.
Director

Dear Friends,

Reflecting back on the last nine years brings me great pleasure. The CMSE is an organization focused on improving mathematics and science education throughout Mississippi and beyond. It is a mission that I believe in wholeheartedly. We offer a valuable resource for teachers, students, faculty, parents and more. Having reached more than 10,000 students, 3,000 teachers and provided more than 25 graduate research fellowships, the CMSE's impact continues to expand.

All of this is made possible through the generosity of the Robert M. Hearin Support Foundation and the University of Mississippi. Without continuous financial support, we would not have the opportunities to pursue and create programs that make us a center with statewide impact. We have also been very fortunate to build a staff of professionals who are dedicated, knowledgeable and passionate about producing high-quality programs that inspire K-12 students and support in-service and pre-service teachers in STEM fields. I am proud of the CMSE and its collaborative efforts to connect our university to K-12 educational communities. I am humbled to have served here from the beginning and look forward to many more years of great work.

Alice Steimle, Ph.D.
Associate Director

TIMELINE

Mar 2006
Drs. John O'Haver and Maurice Eftink submit CMSE proposal to Robert M. Hearin Support Foundation

Dec 2006
Hearin Foundation awards startup grant to create CMSE.

Feb 2007
Dr. Alice Steimle joins as associate director.

May 2007
CMSE co-hosts first symposium for mathematics educators in Mississippi.

June 2007
Inaugural cohort of six graduate research fellows join CMSE.

Jun/Jul 2007
CMSE hosts inaugural UM MathCamp with 60+ middle and high school students.

Mar 2012
CMSE named Affiliate Partner with FTC Robotics Program.

Mar 2012
Research/Grants Division forms.

Nov 2011
Inaugural Mathematics Specialist Conference begins.

July 2011
Professional Development Division forms.

Jun/Jul 2011
MathCamp attracts 153 students.

May 2012
Private donor awards $100,000 to support FTC Robotics Program.

June 2012
Hearin Foundation awards continuation grant to CMSE.

Jun/Jul 2012
Engineering Camp welcomes 21 students.

July 2012
CMSE receives NSF Robert Noyce Scholarship Grant.

Nov 2012
CMSE lands MDE grant to form DEEP Learning Communities Project.

Feb 2013
Inaugural Mississippi FTC Championship hosted at UM.

Jan 2008

CMSE co-hosts MS Space Grant Consortium Annual Teacher Conference.

Jun/Jul 2008

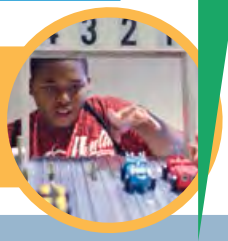
CMSE hosts 100 middle and high school students for MathCamp.

Fall 2008

CMSE awards first UM scholarship for dual major in math and math education.

Oct 2008

K-12 STEM Outreach Division forms.



May 2009

CMSE lands MDE grant to create Project PrIME.

May 2009

CMSE begins coordination of mathematics courses for teacher candidates.

Jan 2011

CMSE partners with MAMTE and MDE to revamp Secondary Mathematics Supplemental Endorsement.

Jun/Jul 2010

Engineering Camp grows to 41 students.

Nov 2009

CMSE receives federal grant for MaPLES Initiative.

June 2009

CMSE co-hosts first Engineering Camp.

June 2009

Hearin Foundation awards continuation grant to CMSE.

May 2013

Private donor awards $50,000 to support FTC Robotics Program.

June 2013

CMSE co-hosts Wind Energy Engineering Camp.

May 2014

Entergy Foundation Awards $25,000 to support FTC Robotics.

Jun/Jul 2014

MathCamp attracts 102 students. Wind Energy Engineering Camp welcomes 52 students.

Aug 2014

CMSE registers 2,500th educator for professional development.

Nov 2014

MS FTC grows to 47 teams, a 975% increase.

K-12 STEM Outreach | Academics | Professional Development | Research

K-12 STEM OUTREACH

At the CMSE, we believe K-12 STEM subjects should be taught in exciting, engaging and challenging ways in and out of the classroom. Every year, our programs impact a growing number of students and support educators across Mississippi and beyond. What started with MathCamp has grown to include 10 programs.

Nathan Latil

Students make preparations before a CMSE Trebuchet competition in Vaught-Hemingway Stadium.

Trebuchet Competition

The annual Trebuchet Competition engages middle and high school students with a contest that marries ancient history with modern day technology. Students are challenged to construct a device capable of launching tennis balls as far, accurately and quickly as possible. This competition attracts students from various STEM subjects.

STATS

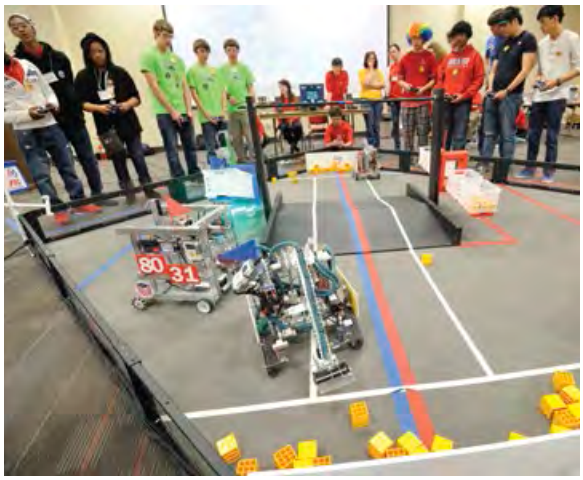
- Est. 2005
- 150+ students impacted annually
- 9 partner schools

FTC Robotics

The CMSE's Mississippi *FIRST* Tech Challenge, or FTC, robotics program helps educators teach mathematics and scientific concepts in an exciting and competitive way! The program has grown from four to 47 robotics teams across Mississippi. With support from CMSE staff, more and more students participate each year. The center provides new teams with a start-up kit and design support for teams. Through the FTC organization, students can apply for various scholarships across the nation with a combined value of $20 million.

STATS

- Est. 2012
- 975% increase in participation over four years
- 400+ students attended the CMSE's state robotics competition in 2014
- FTC students are 50% more likely to attend college



Kevin Bain

In 2014, competing FTC teams designed robots to lift and place blocks onto a pendulum in a game called FTC Block Party.

STEM Competition

The CMSE STEM Competition is designed to highlight and integrate multiple STEM fields into one hands-on competition. The daylong tournament includes a known challenge which allows students to design and build a device or structure to meet a specific criteria and an unknown challenge which tests students' technical savvy and knowledge of STEM principles.

STATS
- Est. 2009
- 150+ students participate annually
- 17 partner schools

Robert Jordan

Students design a miniature water tower to withstand an earthquake simulated by a shake table.

MathCamp

MathCamp helps rising fifth through eighth graders improve their understanding of mathematics in an exciting environment. Students must be recommended by their teachers to join the four-day summer camp. The camp was created by the CMSE to target children who demonstrate a significant need for a positive learning experience and a deeper understanding of mathematical concepts. Learning activities range from children building their own space-style rovers operated with graphing calculators to the physics behind the blast of a fire hose.

STATS
- Est. 2007
- 178 partner schools
- 500+ students impacted to date

Nathan Latil

MathCamp students use recycled materials to build a model space shuttle to simulate a spaceflight to Mars.

Nathan Latil

The planetarium allows students to explore our solar system in an immersed environment.

Portable Planetarium

The CMSE's Portable Planetarium brings the wonders of the universe to schools across the state! Designed for elementary students, children can learn about physics and astronomy in an immersed environment. The inflatable planetarium can be broken down and shipped to schools throughout Mississippi.

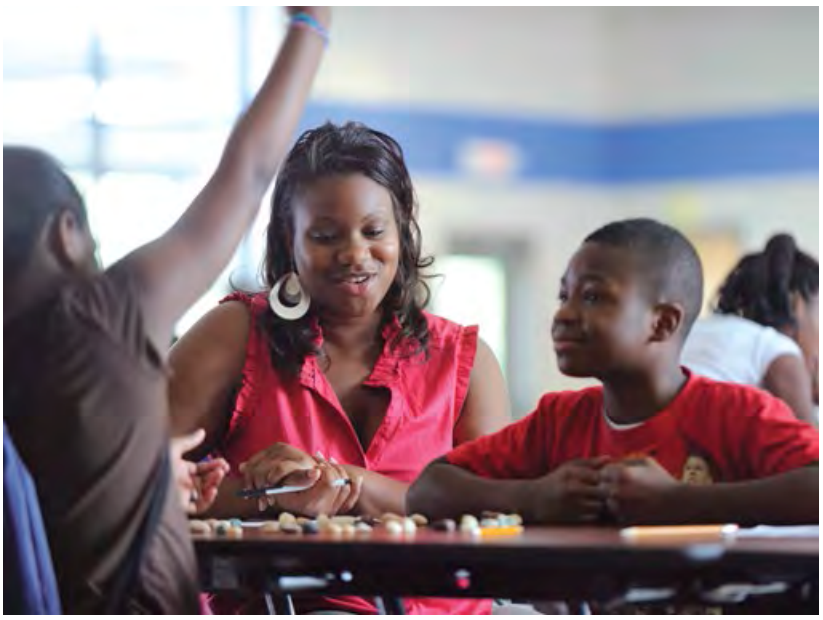
STATS
- Est. 2012
- 21 partner schools
- 6,500+ students impacted to date

Other K-12 STEM Outreach

- MATHCOUNTS Competition
- Real World Design Challenge
- Engineering Camp
- Alumni MathCamp
- ASM Teachers Camp

PROFESSIONAL DEVELOPMENT

Through our Professional Development Division, the CMSE provides educators with the necessary resources to positively affect student learning. Through our Research Division, we evaluate the real world impact of our programs.



Nathan Latil

Project PrIME partnered with the Boys & Girls Club to allow teachers to implement new teaching strategies.

The MaPLES Initiative

Mathematically Proficient Leaders in Elementary Schools

By utilizing content-focused workshops, the MaPLES Initiative brought together elementary math teachers from Lee County. The educators enhanced their mathematical knowledge and increased their average performance on a university-administered content exam by more than four points after just one year.

Funded by the U.S. Department of Education

STATS

- 2010-2011
- 17 participating teachers
- 380 students impacted
- 17% growth in students scoring proficient or advanced in math

Project PrIME

Promoting Innovation in Mathematics Education

To support mathematics instruction in grades 4-8, Project PrIME mobilized more than 100 Mississippi educators, primarily from high-needs districts, to undergo in-depth summer institutes focusing on content knowledge and practice. In three years, the teachers increased the scope of their mathematical knowledge to take back to their districts.

Funded by the Mississippi Department of Education Math & Science Partnership

STATS

- 2010-2013
- 131 teachers
- 20,000 students impacted
- 87% of teachers represented high-needs schools

Mathematics Specialist Conference

Nathan Latil

High school math teachers learn new teaching techniques at a geometric transformation workshop at the CMSE.

Nathan Latil

The CMSE's ASM Teachers Materials camp gives educators a hands-on learning experience that is easily recreated in their own classrooms.

To reach out to lead teachers, curriculum coaches and administrators, the Mathematics Specialist Conference draws educators from across the state who want to learn new strategies for providing curriculum support and leadership in mathematics. Since the first event with just 24 teachers, the conference has seen more than 300% growth in just four years!

STATS
- 2011-Present
- 253 participating educators
- 300% growth in attendance

Common Core Workshop Series & Mini-Institutes

With the adoption of Common Core State Standards in Mississippi comes a new way of teaching and learning mathematics. The CMSE's Common Core Workshop Series provides K-12 teachers the opportunity to engage in learning how to teach mathematics through problem solving, modeling and utilizing repeated reasoning. With more than 17 workshops or mini sessions to date, teachers across the state have learned to engage their students in new hands-on learning opportunities.

STATS
- 2011-Present
- 947 participating teachers

DEEP Learning Communities Project

Developing Excellence in Education through Professional Learning Communities

In an effort to establish professional learning communities among teachers within their own communities, the DEEP Learning Communities Project builds upon the successes of the MaPLES Initiative and Project PrIME by delivering content-focused learning opportunities to foster a culture of excellence within schools on teachers' home turf. Through specialized training at UM, participating teachers return home to establish learning community sites.

Funded by the Mississippi Department of Education Mathematics & Science Partnership

STATS
- 2013-Present
- 88 participating teachers
- 9 learning community sites
- 6,750 students impacted

Other Professional Development Programs

- ASM Teachers Materials Camp
- Mathematics Teacher Educator Institute
- Middle School Science Teachers Conference
- Mississippi Space Grant Annual Teachers Conference
- On-site Professional Development

ACADEMICS

Rethinking Math For Pre-Service Teachers

CMSE designs specialized courses for education majors

To help UM teacher candidates enter the classroom with a higher proficiency in mathematics, the CMSE became a facilitating agent between the UM School of Education and the Department of Mathematics. In 2008, the CMSE launched a redesign of content-based courses for aspiring teachers. The new courses, Math for Elementary Teachers I & II and Teaching Secondary Mathematics, ditch the traditional lectures format and use problem-solving learning techniques. Our approach allows pre-service teachers to experience mathematics in the same way they will teach in their own classrooms.

STATS
- Est. 2008
- 823 UM students impacted

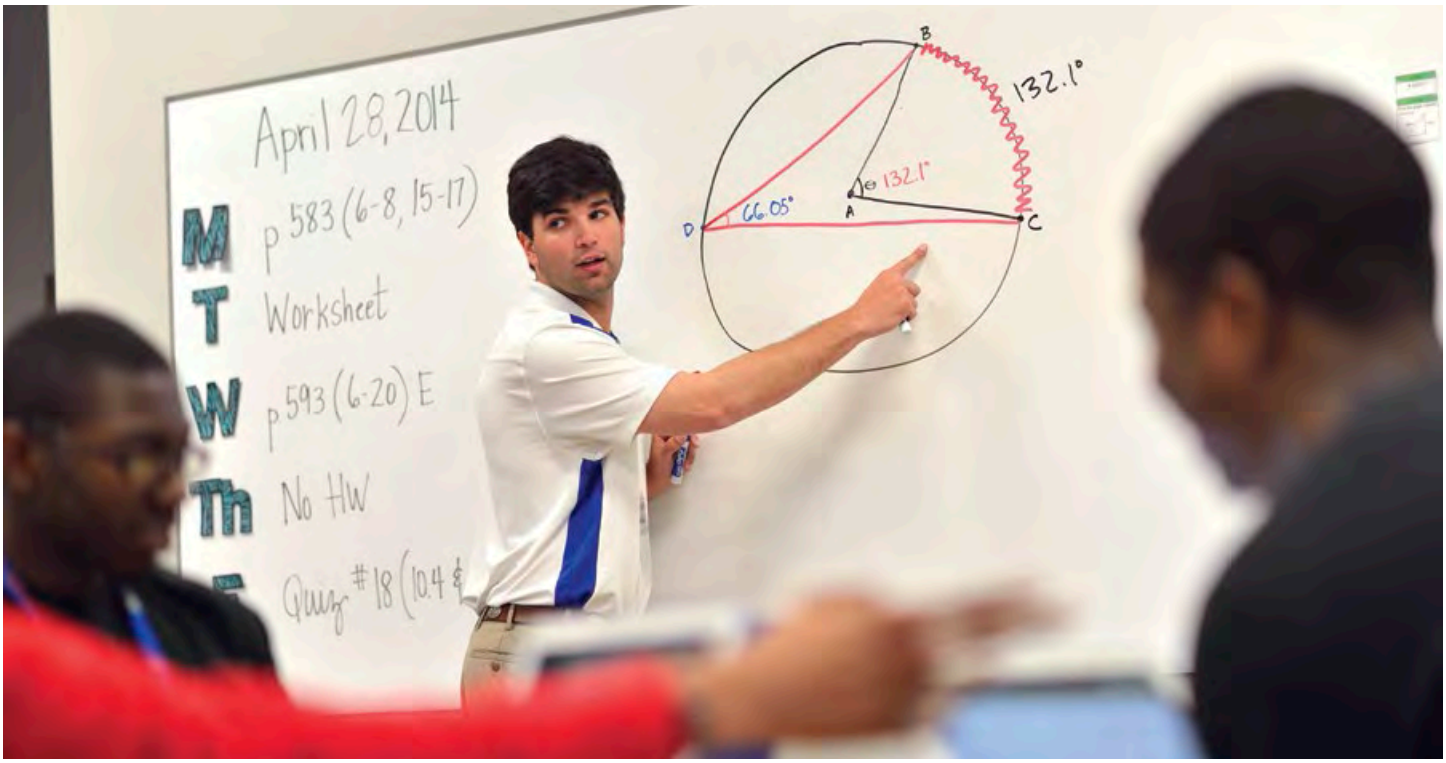
TNT NOYCE Scholars Program

Teachers for a New Tomorrow

Since 2012, UM has offered the highly valuable Robert Noyce Teacher Scholarship to aspiring math and science teachers. Valued at $20,000 a year, the program is designed to attract high performing students into teaching K-12 STEM fields. Graduates commit to two years of service within high-needs schools for each year of financial support.

Funded by the National Science Foundation

STATS
- 2012-Present
- 12 scholarships awarded
- 4 alumni in critical needs schools
- 600% jump in scholarship awards after first year



Nathan Latil

UM Mathematics education alumnus Logan Dodson leads a geometry lesson during his student teaching at Oxford High School.

CMSE STAFF

John O'Haver, Ph.D.
Director
Joined 2006

April Kilpatrick
Research Coordinator
Joined 2009

Alice Steimle, Ph.D.
Associate Director
Joined 2007

Mannie Lowe
FTC Project Manager
Joined 2012

Charlotte Dailey
DEEP Learning Communities Project Coordinator
Joined 2010

Susan Peterson
K-12 STEM Outreach Coordinator
Joined 2012

Paige Gillentine, Ph.D.
Instructional Assistant Professor of Mathematics
Joined 2013

Michelle Robinson
Administrative Assistant
Joined 2011

Julie James, Ph.D.
Professional Development Coordinator
Joined 2011

Jessica Sowers
Professional Development Manager
Joined 2014

CMSE GRADUATE RESEARCH FELLOWS

Each year, a select group of UM graduate students join the CMSE as Graduate Research Fellows. The renewable, 12-month fellowship is valued at approximately $30,000 a year and includes tuition, professional development and a $20,000 living stipend! Today, our current and alumni fellows are making an impact in Mississippi and beyond.

Brian Buckhalter
Program: Ed.D. in Elementary Education (Mathematics)
Joined 2013

Efia Mentuhotep
Program: Ph.D. in Mathematics Education
Joined 2011

Whitney Jackson
Program: Ed.D. in Elementary Education (Science)
Joined 2013

Becky Nance
Program: Ed.D. in Elementary Education (Mathematics)
Joined 2013

Casey Losee
Program: M.Ed. in Elementary Education (Mathematics & Science)
Joined 2014

CMSE Fellowship Alumni

WHERE ARE THEY NOW?

2007

Jennifer Fillingim
Lead Mathematics Specialist
Madison County School District
Madison, MS

Ph.D., Mathematics Education, 2010

Shannon Harmon
Lecturer in Elementary Education
Middle Tennessee State University
Murfreesboro, TN

Ed.D., Mathematics Education, 2012

Jessica Ivy
Assistant Professor of Mathematics Education
Mississippi State University
Starkville, MS

Ph.D., Mathematics Education, 2011

Julie James
Professional Development Coordinator
CMSE, The University of Mississippi
Oxford, MS

Ph.D., Mathematics Education, 2011

Michael McCrory
Assistant Professor of Mathematics Education
Blue Mountain College
Blue Mountain, MS

Ph.D., Mathematics Education, 2010

Elizabeth A. Wells
Assistant Professor of Mathematics Education
University of Arkansas, Pine Bluff
Pine Bluff, AK

Ph.D., Mathematics Education, 2010

2008

Erica Paige Gillentine
Instructional Assistant Professor of Mathematics
University of Mississippi

Ph.D., Mathematics Education, 2013

Julie Riales
Instructional Specialist for Mathematics
Grenada School District
Grenada, MS

Ph.D., Mathematics Education, Mathematics, 2011

2009

Carl Dewitt
Physics Instructor
Hinds Community College
Pearl, MS

Ph.D., Science Education, 2013

Lisa Ewell
Instructor of Mathematics
University of Mississippi
Oxford, MS

M.S., Mathematics, 2011

2010

Katy Witt Edgar
Math Teacher
New Hope High School
Columbus, MS

M.Ed., Elementary Education (in progress)

Sydney Margaret Holbert
Assistant Professor of Elementary Education
Mississippi College
Clinton, MS

Ed.D., Elementary Education, 2013

2011

Wendy Bryson Crawford
Math Teacher
Saltillo Elementary School
Saltillo, MS

M.Ed., Elementary Education (in progress)

Elizabeth Prewitt
Assistant Professor of Biology
Blue Mountain College
Blue Mountain, MS

Ph.D., Science Education, 2014

2012

Mary Margaret Boudreaux
Math Teacher
Oxford Middle School
Oxford, MS

M.S., Mathematics, 2014

Ray Holt
Founder/President
STEM Advancement Inc.
Mt. Olive, MS

M.A.C.I., Mathematics Education, 2013

Bethany LaValley
Math Teacher
Calhoun County Schools
Calhoun City, MS

M.A.C.I., Mathematics Education, 2014

Matt Nelms
Graduate Research Assistant
University of Mississippi
Oxford, MS

M.A.C.I., Mathematics Education (in progress)

Sarah Sams Weyrens
Science Teacher
Louisville Collegiate School
Louisville, KY
M.A.C.I., Mathematics Education, 2013

2013

Katherine Brock
Math Teacher
East Nashville Magnet High School
Nashville, TN
M.A.C.I., Mathematics Education, 2014

Jessica Peralta
Math Teacher
Oxford High School
Oxford, MS
M.Ed., Mathematics Education (in progress)

"For me, the most valuable aspect of the fellowship was that it allowed me to pursue graduate school full-time, attend professional conferences and engage in scholarly activities in a cohort environment."
–Jessica Ivy

"My experience at CMSE was invaluable and incomparable to any other. Having opportunities to research, write and present at conferences is wonderful for helping fellows grow their vita and become great candidates for future jobs."
–Sydney Margaret Holbert

"The CMSE gave me the ability to dream bigger. The fellowship shapes you to be a mathematics education leader."
–Erica Paige Gillentine

"The fellowship helped me to see the relationship between public schools, especially rural, and the University. The emphasis on educational research has fine-tuned my thinking."
–Ray Holt

"Having the opportunity to be part of a community of passionate people working together to make a difference in education meant the world to me."
–Jessica Peralta

AT A GLANCE

912
Professional development attendees in 2013-14

45%
MS school districts utilizing CMSE professional development

975%
Increase in competitive FTC robotics teams since 2009

Through *innovative practice* and *hands-on programs*, the CMSE is making a measurable impact in K-12 STEM education throughout Mississippi.

6,500+
Students impacted by Portable Planetarium

823
Pre-service teachers enrolled in CMSE led courses since 2008

25
Graduate fellowships awarded since 2007

790%
Increase in math education Ph.D. and Ed.D. graduates at UM

43
Partner school districts statewide

$6.1 million
External funding since 2006

Center for Mathematics & Science Education est. 2006
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