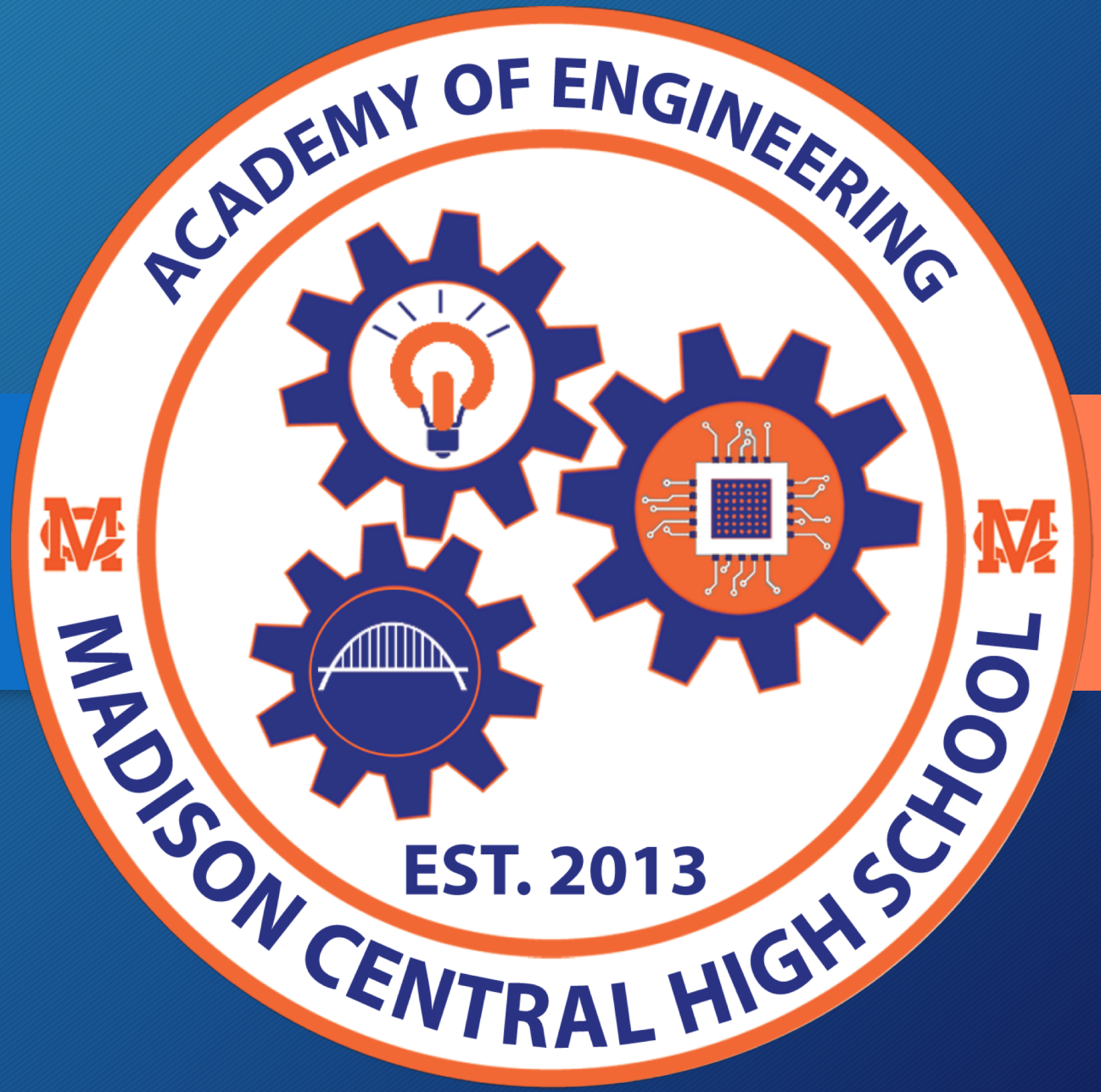
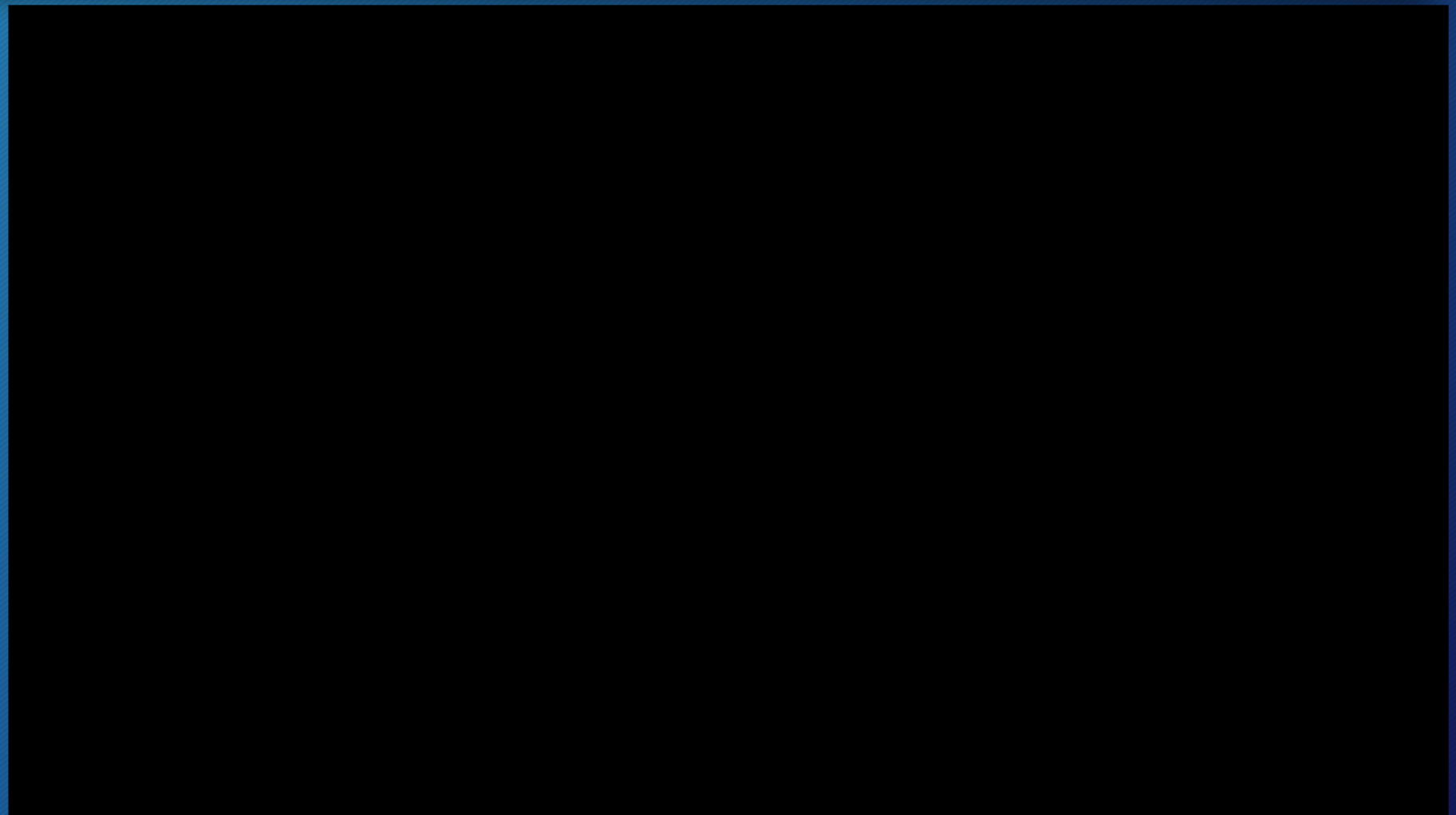

ACADEMY OF ENGINEERING
MADISON CENTRAL HIGH SCHOOL
EST. 2013

Academy Overview



District Introductions

- **Mrs. Kimber Halliburton**

  Superintendent
- **Ms. Edith Mitchell**

  Associate Superintendent
- **Mrs. Charlotte Seals**

  Associate Superintendent
- **Dr. Aimee Brown**

  Director of CTE and Career Academies

Madison Central Jaguar Zone

<u>Madison Central High -10th – 12th grade</u>
Mr. Sean Brewer – Principal

Mrs. Mary Edwards – Assistant Principal
Academy of Engineering Principal

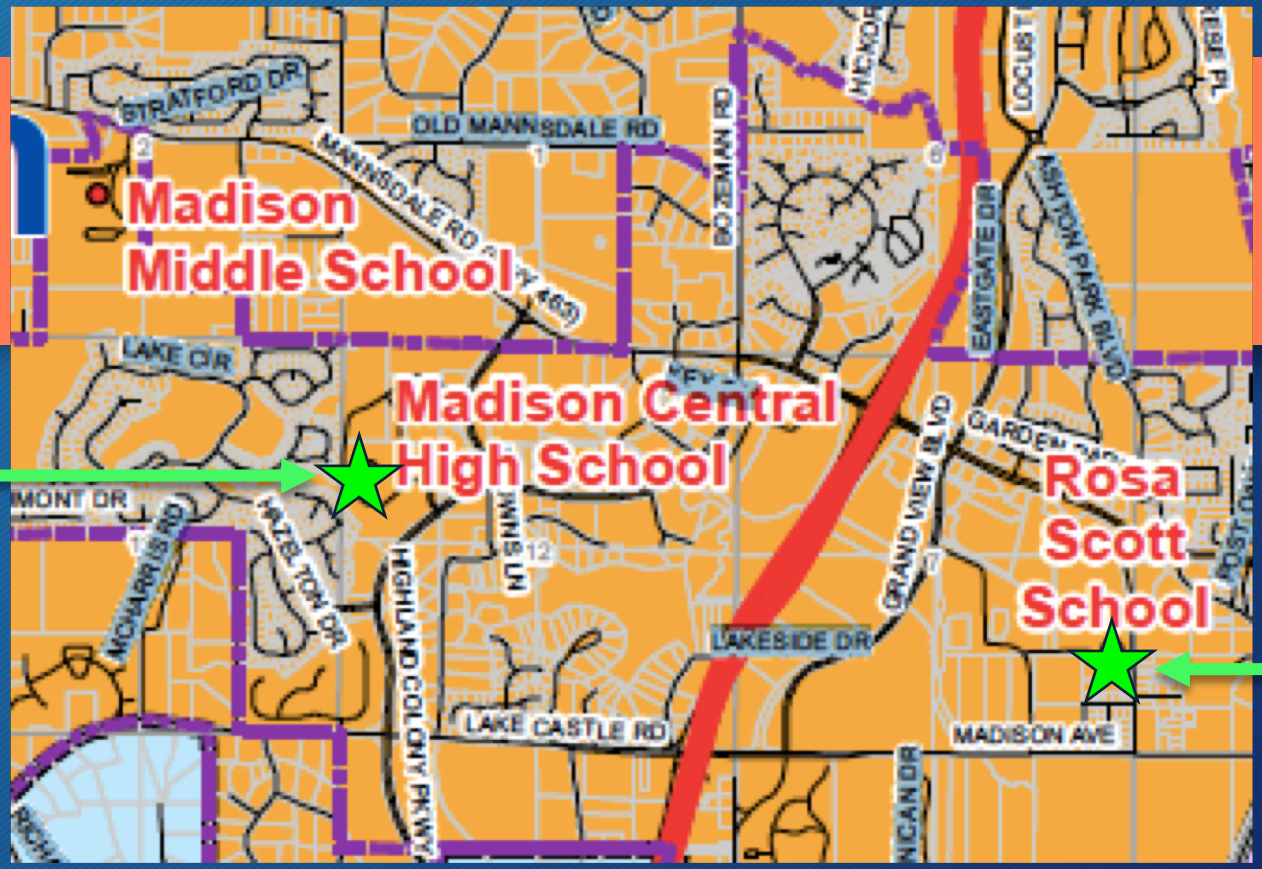
<u>Rosa Scott– 9th grade</u>
Mr. Brent Cofield – Principal

Madison, MS

- Located just north of our state capital
- 64% population increase in the last 10 years
- Largest employers – Nissan North America, MCSD
- Awards
  - Mississippi's Safest City
  - Top 10 Best Towns for Families by Family Circle magazine
  - One of the 100 Best Places to Live in America by Money Magazine
  - One of US News Best Places to Retire

Jag Zone

Madison Central
10th – 12th grades



Rosa
9th grade

- Approximately 1,650 students on both campuses
- 15% Free/Reduced lunch
- 67% Caucasian, 26% African American, 5% Asian, 2% Hispanic
- First graduating class May 1992
- High school campuses are approximately – 3 miles apart

Madison Central High School

"A Tradition of Excellence"

Academics

- Graduation rate - 92%
- 15 years of ACT scores above the state and national averages. Currently 22.4
- A-rated on state accountability model
- Top high school for college/career readiness on state accountability model
- Consistently have the highest number of National Merit Semifinalists in state for any public, private, or parochial school
- National Champion Academic Decathlon team
- Nationally recognized Speech and Debate program

Madison Central High School

"A Tradition of Excellence"

Athletics

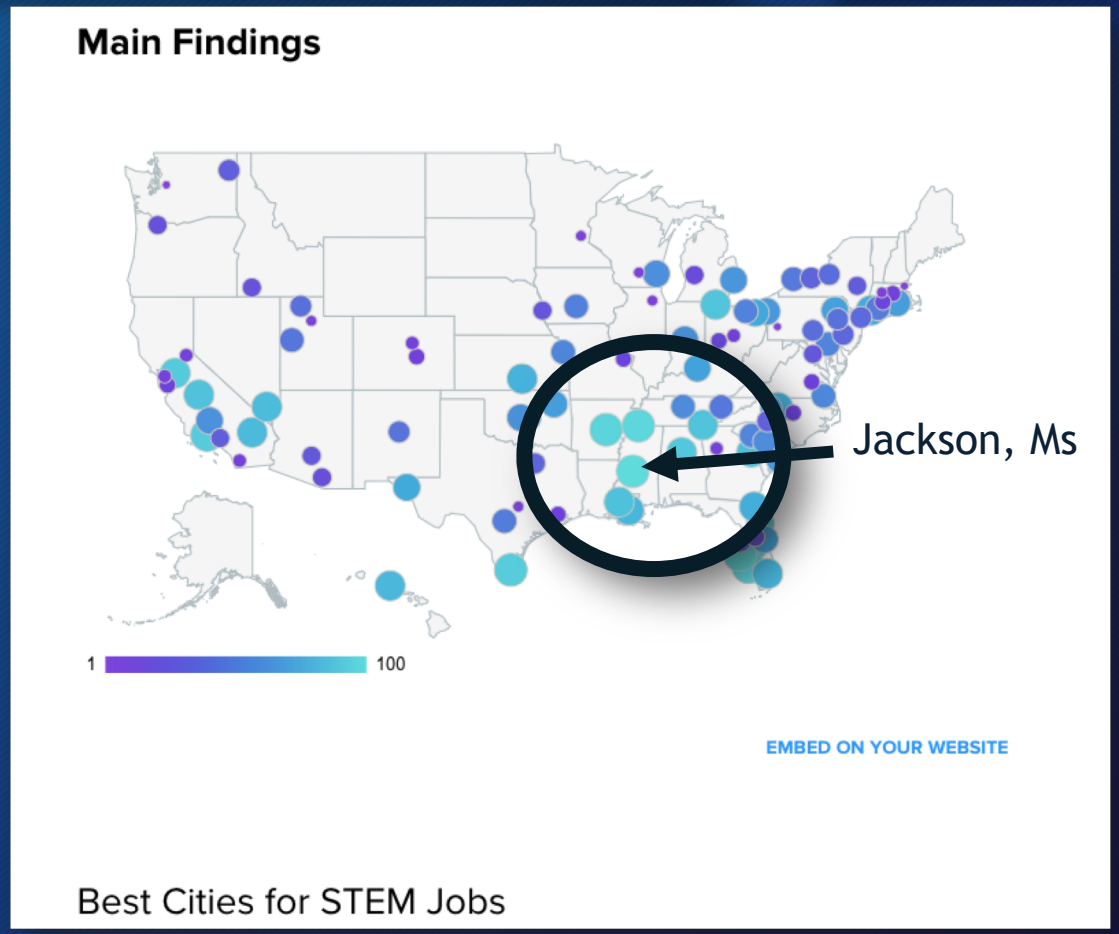
- All Sports Award for top athletic department in the state's largest classification (6A) 5 out of last 6 years

Arts

- All superior arts, band, choir

Why we started academy

- Career interest surveys illustrated that a significant number of students were interested in STEM and Engineering careers.
- The economic and business makeup of Madison County and determined there were many engineering and STEM-related businesses and industries who could benefit from the academy.



https://wallethub.com/edu/best-worst-metro-areas-for-stem-professionals/9200/

Overview of NCAC Review Process

Time	Event
	Baseline Review
1 year - least 2 months prior	Request an NSOP review
6 weeks prior	Complete Surveys from Academy Stakeholders - • Advisory board • Academy faculty • Academy Principal • Academy Lead
1 month prior	Upload Self-Report
	Upload Supporting Documentation
	Create an agenda for Audit Day
Audit Day	Presentation, Facility Tour, Interviews

You got this!

Overview of NCAC Review Process

Scores	Academy Certification
115 - 130	MODEL
80 – 114	CERTIFIED
40 - 79	IN PROGRESS

You got this!

Overview of the Academy

- NSOP 1: Defined Mission and Goals (10 pts)
- NSOP 2: Academy Design (15 pts)
- NSOP 3: Host Community and School (10 pts)

Mission Statement

NSOP 1

Prepare students interested in pursuing any engineering or other STEM-related career for the rigorous curriculum at a 2-year or 4-year college and provide authentic workforce training.

Benchmark – 2016 graduates -88% to 4-year college, 12% to 2-year college
2017 graduates – 100% to 4-year college

Goals

NSOP 1

1. Maintain and increase female and non-traditional enrollment above the national average, which is approximately 17% for females and 12.5% for minorities other than Asian.
2. Increase end of course test scores in all PLTW courses to be above the national average of a 5.

Goals, cont.

NSOP 1

3. 100% of graduating engineering academy students have received at least one industry certification.
4. Develop exposure to real world engineering practices by bringing in 1 guest speakers and providing 1 field trip tours for observations in the community per year.
5. The students will achieve science and math literacy by earning at least a C in all science and math classes.

Academy Design
Typical Cohort Structure for 9th -12th

NSOP 2

9th Grade	10th Grade	11th grade	12th grade
Introduction to Engineering (IED)	Principle of Engineering (POE)	Digital Electronics (DE) OR AP Computer Science Principles (AP CSP)	Engineering Design and Development (EDD)
Geometry	Acc. English	Adv. Math Plus (Trigonometry/PreCal)	
	Chemistry		
	Algebra II		

Academy Design

NSOP 2

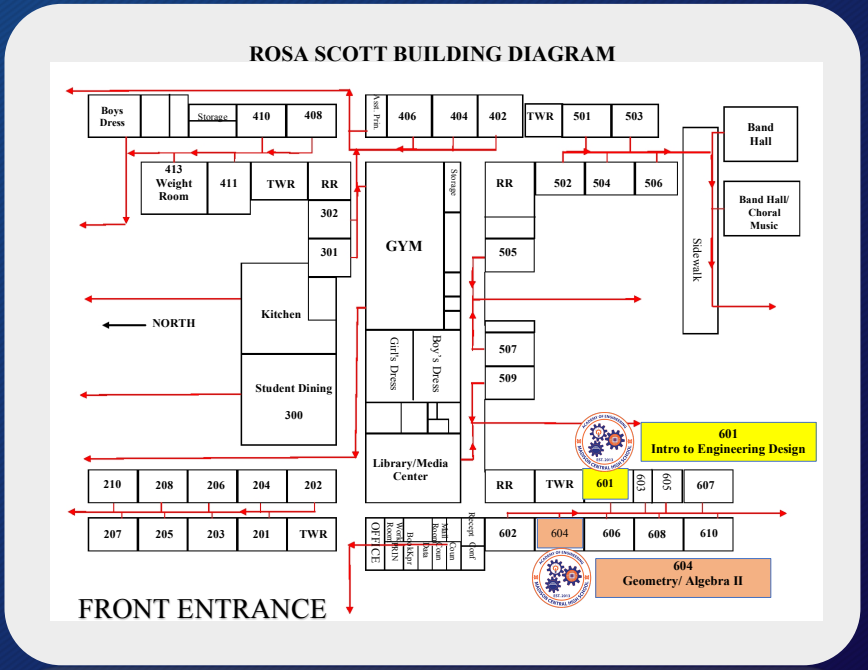
10th Grade	11th grade	12th grade
Introduction to Engineering (IED)	Principle of Engineering (POE)	Engineering Design and Development (EDD)
Geometry	Algebra 2	
English	Chemistry	

Academy Design

NSOP 2

- Pocket Academy - Small size, supportive atmosphere
- Cohorted Scheduling
- Common planning blocks for all academy teachers

National Career Academy Coalition
COLLEGE CAREER LIFE



Academy Design

NSOP 2

- Physical Space - Branding
  - Rosa – classrooms across the hall
  - MC – Engineering classes together others are by department and identified with signs and bulletin boards.

Mission Statement

To prepare students who are interested in pursuing any engineering or STEM-related career for the rigorous curriculum at a 2-year or 4-year college and to provide authentic workforce training.

Host Community and School

NSOP 3

Support from:

- School Board
- Superintendent
- Principals

We are excited about the future of career academies in Madison County Schools and eager to expand participation opportunities to more students.

Ronnie L. McGehee, Ph.D.
Superintendent

Our engineering academy has opened doors for our students…, provided them with skills necessary to succeed in occupations related to STEM. Other benefits of the academy include having teachers who have embraced another dimension of classroom instruction and pedagogy. We believe the success of this program is vital to our school culture.

Austin Brown, Principal
Madison Central High School

The academy has provided students with scholarship opportunities and real world work that they would not have without the academy.

Sean Brewer, Principal
Rosa Scott School

Host Community and School

NSOP 3

District provides funding, equipment, and materials for Rosa Scott and Madison Central

Three PC labs
3-D printers on both campuses
Digital Electronics Equipment

Engineering Academy builds tech program

Katie King
LAYOUT EDITOR

The Engineering Academy at Madison Central has been in place for four years. Through this innovative program, students can learn key information about engineering and/or STEM-related careers.

The Academy does its best to prepare students for any two or four-year college program. The Engineering Academy goes through a program called "Project Lead the Way." PLTW provides the curriculum for the MC Engineering Academy. Through this rigorous curriculum and dedication, the program teaches students the basics of engineering. Komal Kaur (10) said, "It makes you think more than you would normally think about something." They learn skills like technical writing, programming, public speaking, etc. It allows students the opportunity to see if they are interested in an engineering or STEM related career before they get to college. Chris Hood (12) mentioned, "People go into engineering in college after doing no engineering, and most of them drop out because it's really hard and they don't know what they are doing. [The Academy] was made so that people would have an idea of what engineering is before they throw themselves into it."

Many of the engineering students have received awards and scholarships for their hard work. Last year, a group of engineering students competed in a competition sponsored by C Spire and each won $3000. They also compete in Science Olympiad, and tenth and twelfth grade students participate in the Science Fair.

In order to be in this program, students must have taken Algebra I, be interested in the engineering and or STEM-related fields, and fill out an application online. This course is not listed on students' course sheets, so they must fill out an application on their own and wait until their counselor notifies them. The opportunity to join the Engineering Academy first presented itself to rising ninth graders who have completed the prerequisites, but it is now also open to students in tenth grade who have completed the requirements.

The Engineering Academy's classes are formatted in a way that the curriculum in engineering follows the same curriculum of all of the students' core classes. Their core classes, such as math and science and English, are cohorted with the engineering program. That means that they are in many of the same classes with the same engineering students. Therefore, the classes are smaller and more hands-on. Michelle Robinson, co-head of the Engineering Academy, commented, "You have somewhere to belong." The teachers involved in the Engineering program or who teach cohorted classes are Michelle Robinson, Cam Ogletree, co-head of the Engineering Academy; Paula Mayfield, mathematics; Laura Miller, sophomore English; Amy Bennett, chemistry; and Regina Ballentine, freshman Intro to Engineering Design.

Each increasing academic year provides new courses offered to engineering students. In ninth grade, all students who sign up for Engineering take Intro to Engineering Design. In tenth grade, after they have completed Intro to Engineering Design, students take Principles of Engineering. In eleventh grade, students have the choice to take either AP Computer Science Principles or Digital Electronics. Then finally, senior engineering students take Engineering Design and Development. These seniors identify a problem in the world and apply what they have learned from the past three years of engineering to try and fix it.

The Engineering Academy at MC has grown over the past four years into a program that helps shape the school into what it is today. Amy Pang (11) said, "It's little things that I pick up in engineering that I can use in the future." The students leave high school prepared and equipped for college-level engineering programs.

Christian Watson (11) solders a number generator. Photo by: Katie King *Upvoar*

PLTW Teacher Training
Adequate building space
VEX Robotics

NSOP 1: Defined Mission and Goals
NSOP 2: Academy Design
NSOP 3: Host Community and School

Academy Leadership

- NSOP 4: Faculty and Staff (10pts)
- NSOP 5: Professional Development and Continuous Learning (15 pts)
- NSOP 6: Governance and Leadership (15 pts)

Academy Staff

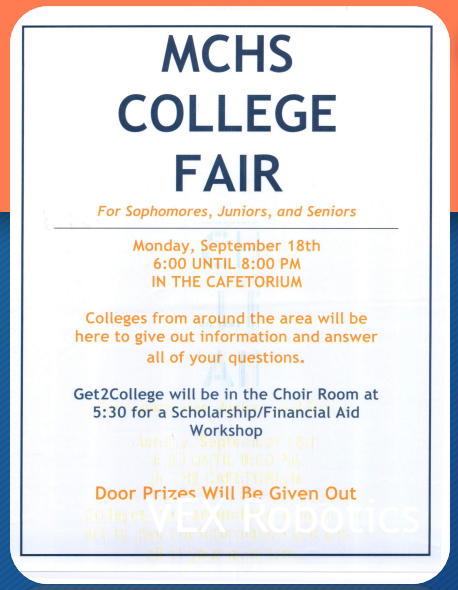
NSOP 4

- Academy Coordinators
  - Academy Principal
  - Academy Director/Lead Teacher
- Six Academy Teachers
  - All highly qualified in their areas
  - Five have Master's Degrees
  - Three are National Board Certified
  - All volunteered to work in the academy

Counselor Support

NSOP 4

- Reality Fair
- St. Dominic's Healthcare Career Fair
- Career Field Trips
- College Fair



Nissan Engineers

Reality Fair

Professional Development and Continuous Learning

NSOP 5

- Teacher externships
- PLTW trainings, conferences and summits
- NCAC conferences and in house PD training for all
- Technology PD for 1:1 initiative, integration of Canvas, etc.
- All academy teachers, counselors, administrators and district personnel participated in PD related to the academy over the last 5 years.
- Common planning facilitates opportunities for teachers to share new ideas and plan together.

Advisory Board

Business Partners

- **Christopher D. Jones**, P.E., BCEE, F.NSPE, F.ASCE, CWO, CPCO –Principle Engineer/Engineering Manager, Forensic Consulting Group – Advisory Board Chairman
- **Josh Pepper** – Lead Systems Engineer, Eaton Aerospace, graduate of MCHS
- **Elizabeth Fulcher** – Executive Director, Madison the City Chamber of Commerce
- **Gino Perkins**, CMRP, CAMA – Maintenance Sr. Expert, Nissan North America, Inc.
- **Chamar McDonald** – Civil Engineer, Neel-Schaffer, Inc., graduate of MCHS
- **Victor Branch** – Research Associate, MSU Center for Advanced Vehicular Systems
- **Steve Johnson** – Geologist, Thompson Engineering; Parent of Academy Student

FCG FORENSIC CONSULTING GROUP

NISSAN

EATON

Madison The City CHAMBER OF COMMERCE

thompson ENGINEERING

NEEL-SCHAFFER Solutions you can build upon

CAVS MISSISSIPPI STATE UNIVERSITY

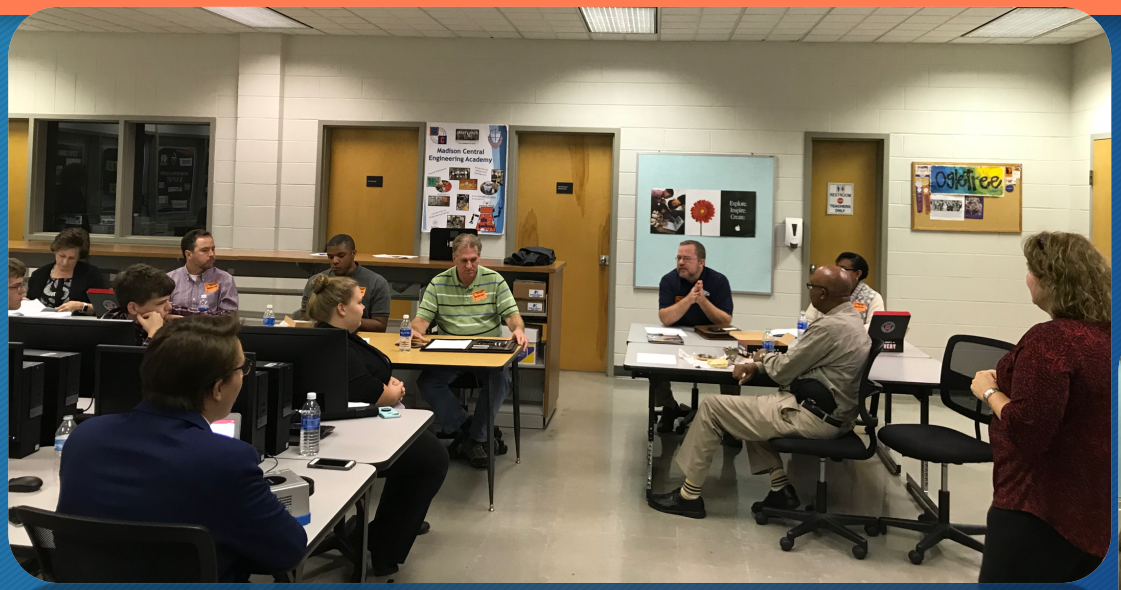
Advisory Board Academic Partners

NSOP 6

- **Aimee Brown** – Madison County School District Career Academies Director
- **Sean Brewer**– Principal, Madison Central High School
- **Mary Edwards** – Academy Principal, Assistant Principal, Madison Central High School
- **Sheena Booker** – 12th grade student representative
- **Wade McDougal** – 11th grade student representative
- **Michelle Robinson** –Engineering Academy Director/Teacher; Parent of Academy Student
- **Cam Ogletree** – Rosa Scott/Madison Central Engineering Academy Teacher

Advisory Board

NSOP 6



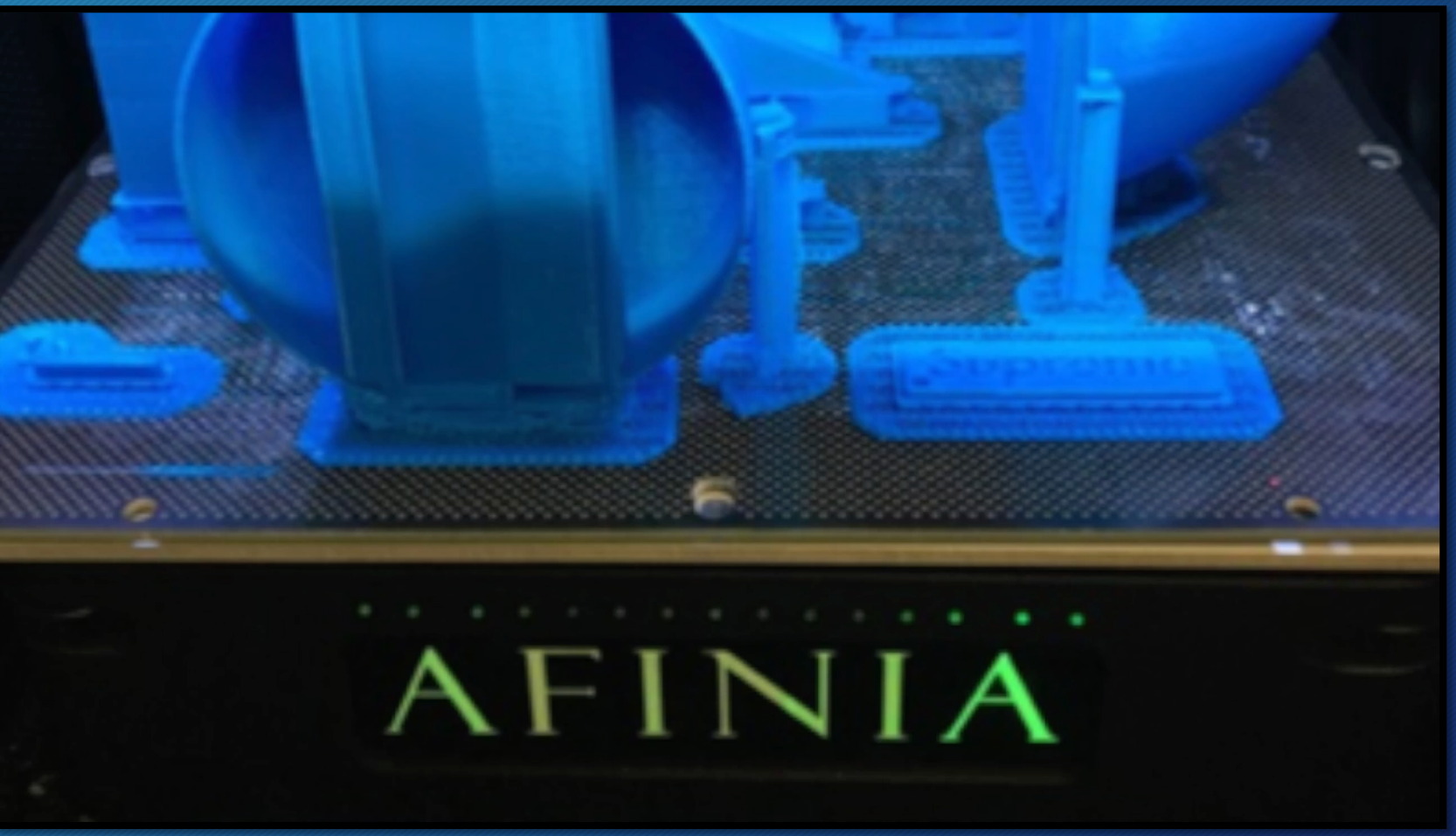
NSOP 4: Faculty and Staff
NSOP 5: Professional Development and Continuous Learning
NSOP 6: Governance and Leadership

Academy Students

- NSOP 7: Student Learning and Teaching (15 pts)
- NSOP 8: Employer, Higher Education, and Community Involvement (15 pts)

Curriculum

NSOP 7

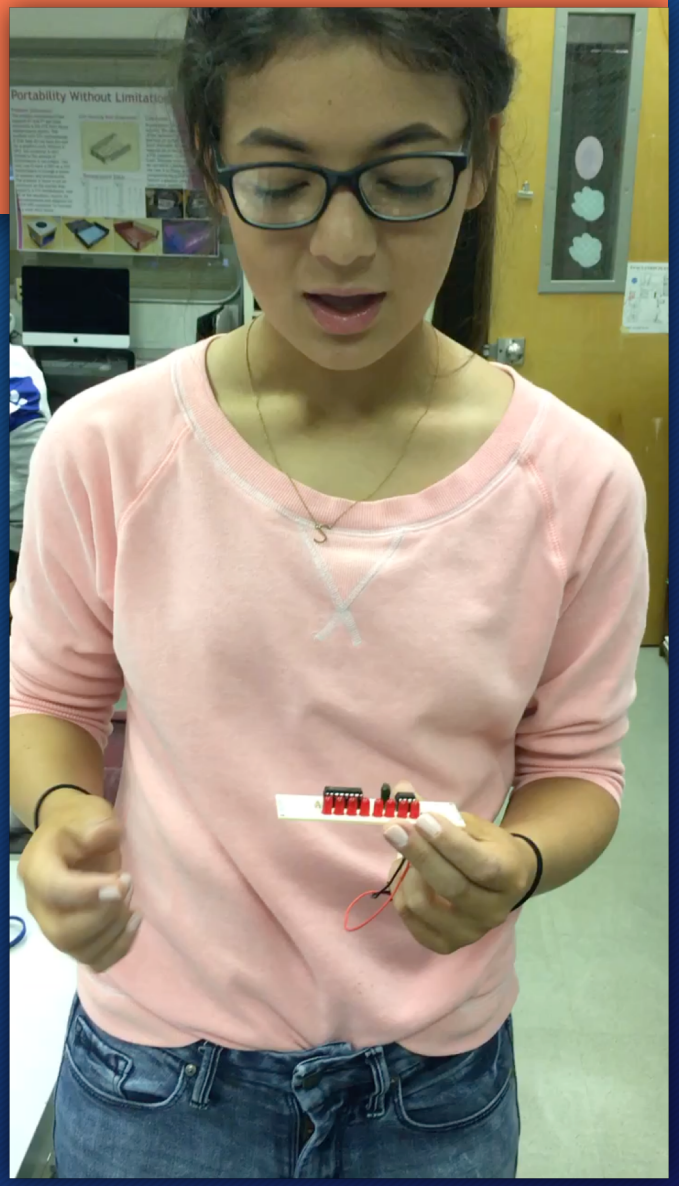


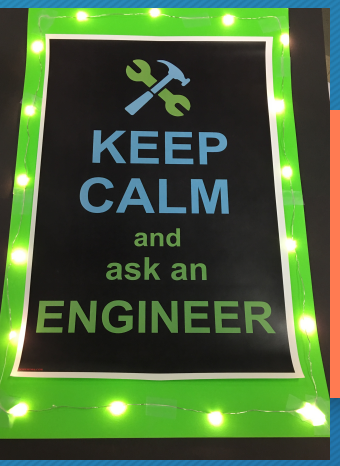
- Project Based
- Rigorous
- Real World Application of academics
- Team oriented
- National Standards

PROJECT LEAD THE WAY
PLTW

Curriculum

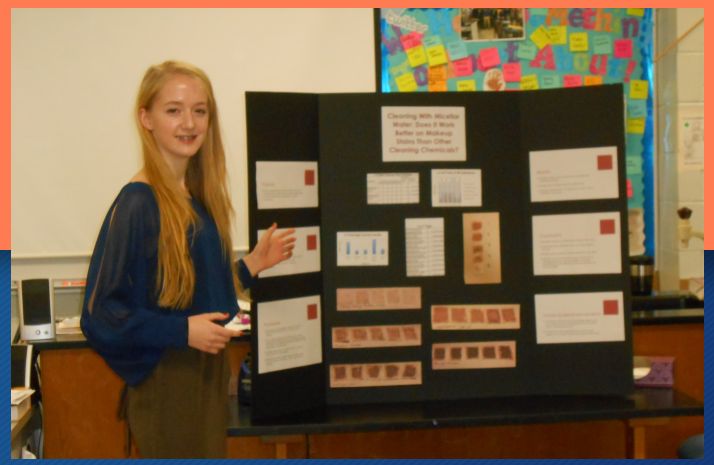
NSOP 7





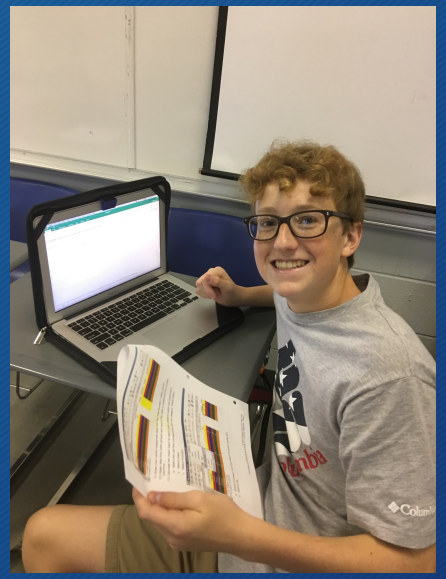
Integrated Units

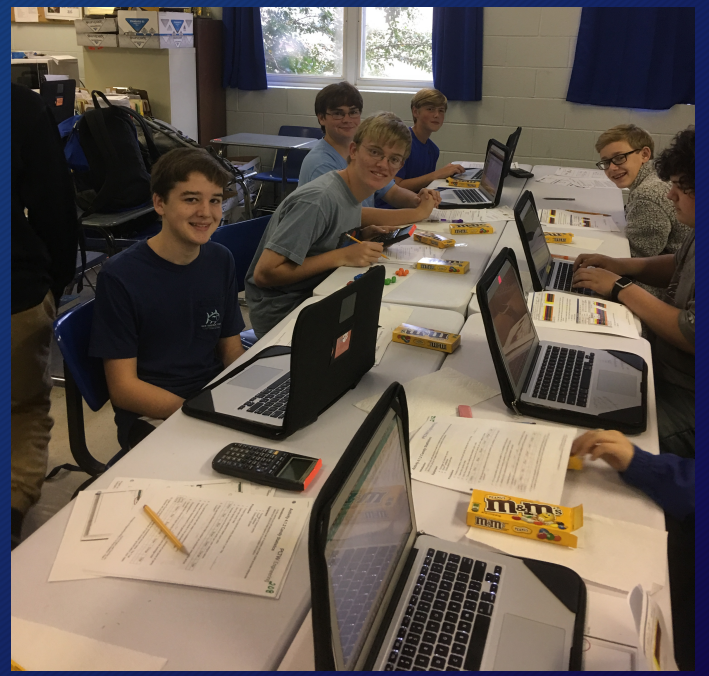
NSOP 7



Just a few examples:

- City planning project
- Science and Engineering Fair
- Quality control statistics



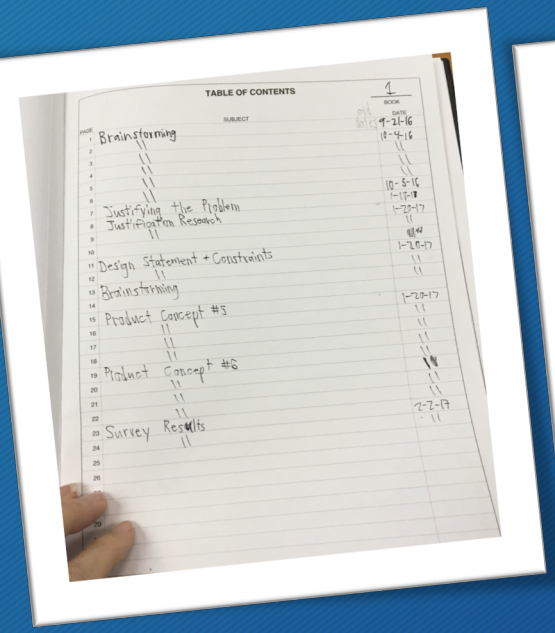


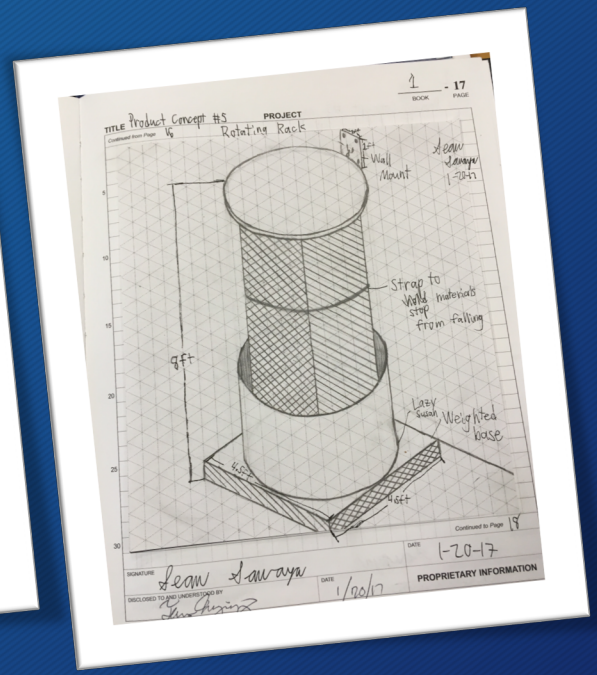
What former students say…

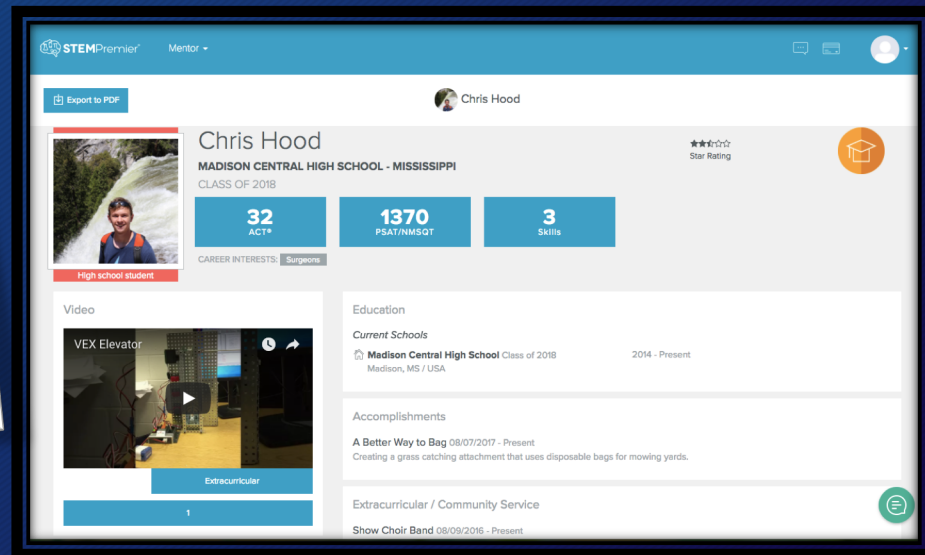
Student Portfolios

NSOP 7

- Engineering notebook each year
- STEM Premiere – online portfolio
- Linked In

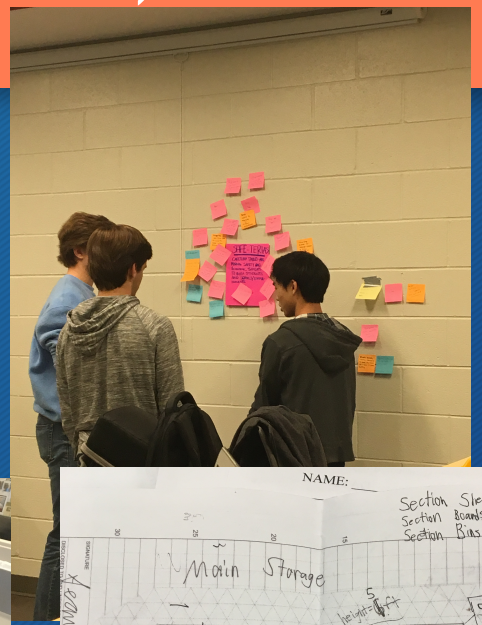


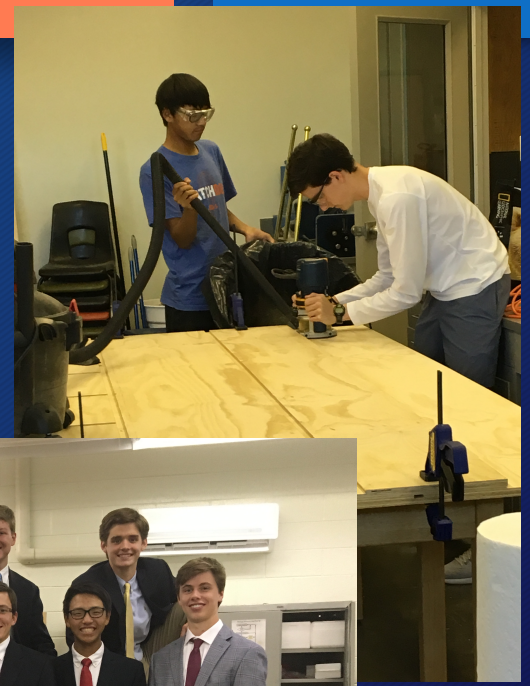


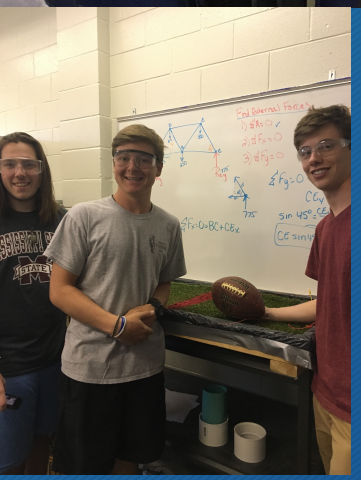


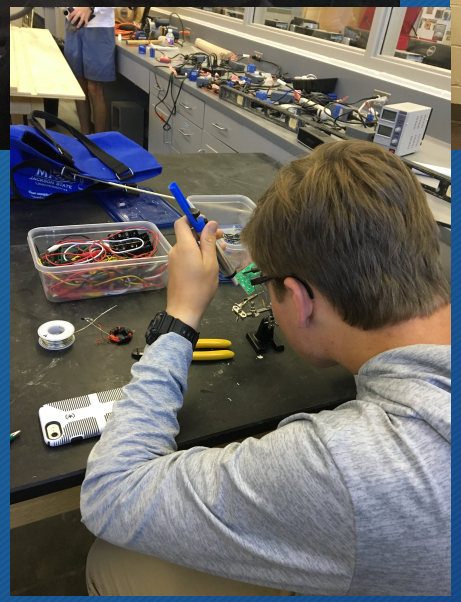
Engineering Design and Development (EDD)

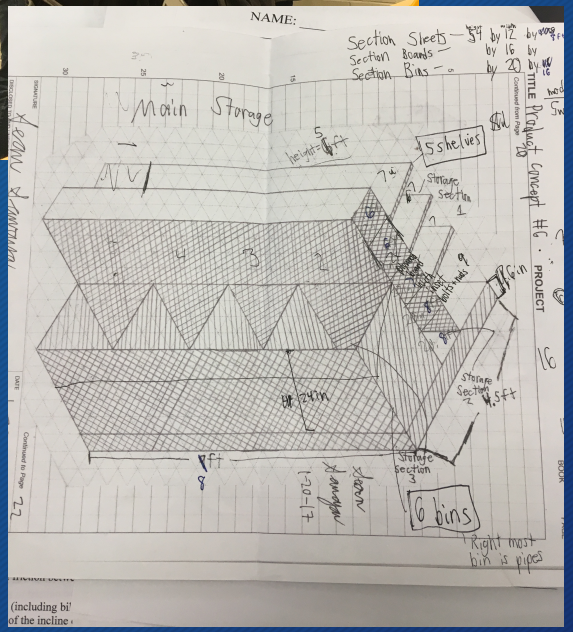
NSOP 7







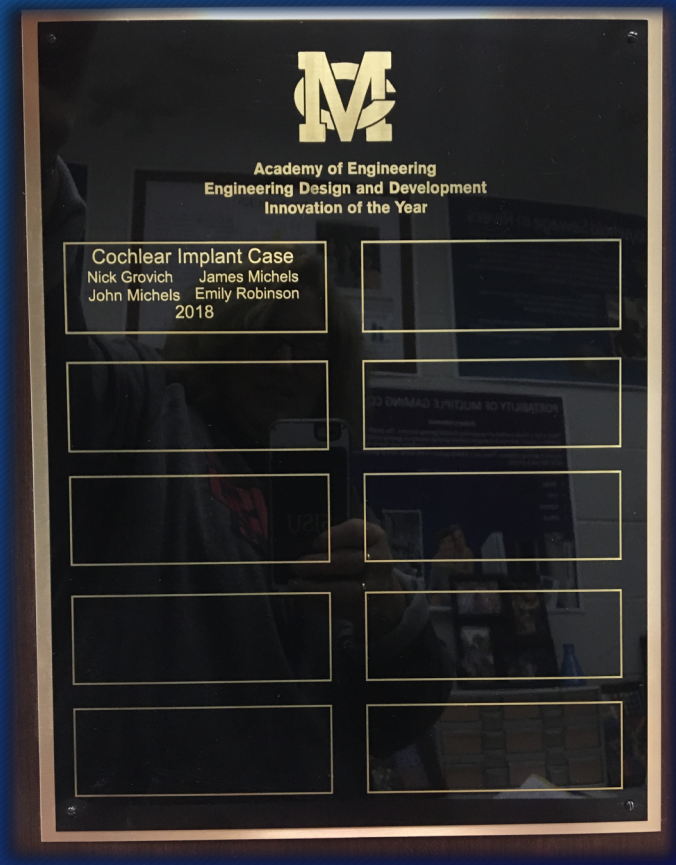




Academy of Engineering Showcase

Engineering Design and Development Capstone Project

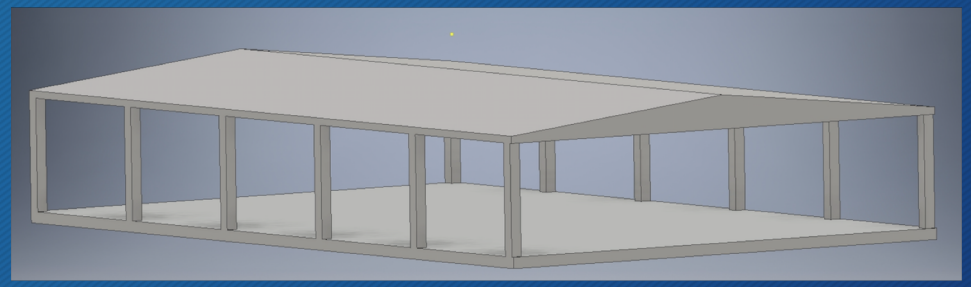
NSOP 7



Community Citizenship

NSOP 7

- Children's Museum volunteers
- Robotics camps over summer
- Bowling trivets
- Drawings for baseball batting cage
- EDD projects



Community Citizenship

NSOP 7

Guest Speakers
Field Trips

Work-Based Learning/Internships

NSOP 7

- Mentors for Capstone Design Projects
- Guest Speakers
- Advisory Board Presentations
- Paid/Unpaid Internships

NSOP 7: Student Learning and Teaching
NSOP 8: Employer, Higher Education, and Community Involvement

Student Assessment

NSOP 9: Student Assessment (15 pts)

Student Assessment

NSOP 9

MCHS Academy of Engineering Historical Data

DATE COLLECTED:	2017-2018 (Current)		2016-2017		2015-2016		2014-2015	
	Academy-Level	Whole School-Level	Academy-Level	Whole School-Level	Academy-Level	Whole School-Level	Academy-Level	Whole School-Level
Total enrollment	112	1741	98	1735	92	1768	82	1758
Percentage Free and Reduced Lunch	6.3%	15.1%	4.0%	18.0%	2.2%	18.6%	0%	17.7%
Percentage English Language Learners	0.0%	0.9%	0.0%	0.90%	0.0%	0.8%	0%	0.5%
Percentage identified as Exceptional, Special Education	10.7%	9.8%	10.0%	8.90%	10.9%	8.8%	12.2%	7.5%
	Academy-Level	Whole School-Level	Academy-Level	Whole School-Level	Academy-Level	Whole School-Level	Academy-Level	Whole School-Level
9th Grade Enrollment	42.0%	26.1%	39.8%	27.0%	46.2%	25.1%	54.9%	26.7%
10th Grade Enrollment	22.3%	24.0%	23.5%	25.4%	29.7%	27.4%	26.8%	25.4%
11th Grade Enrollment	17.9%	24.2%	26.5%	24.7%	15.4%	23.0%	17.1%	25.9%
12th Grade Enrollment	14.3%	24.9%	11.2%	22.9%	8.8%	23.8%	0.0%	21.2%

Student Assessment

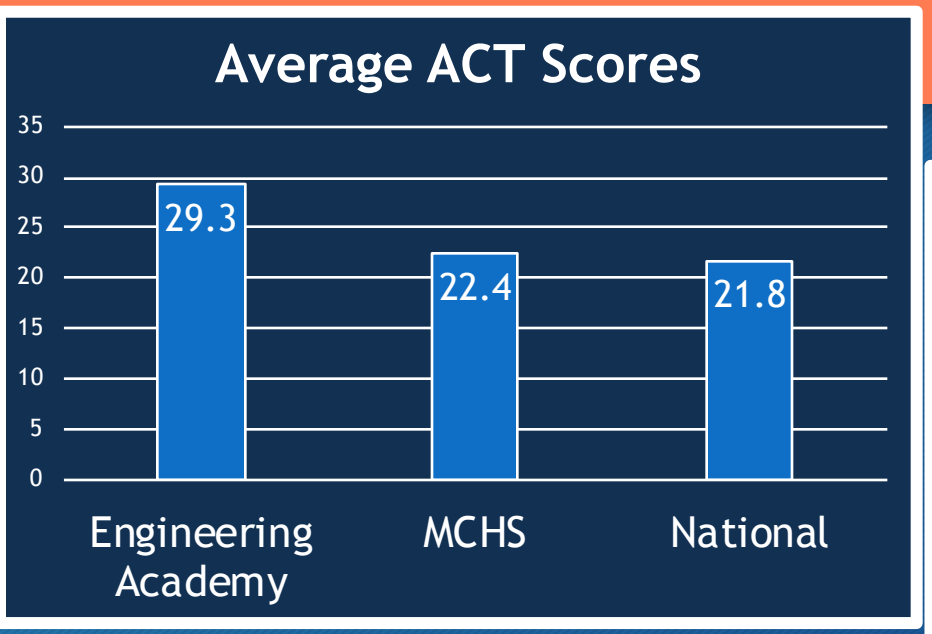
NSOP 9

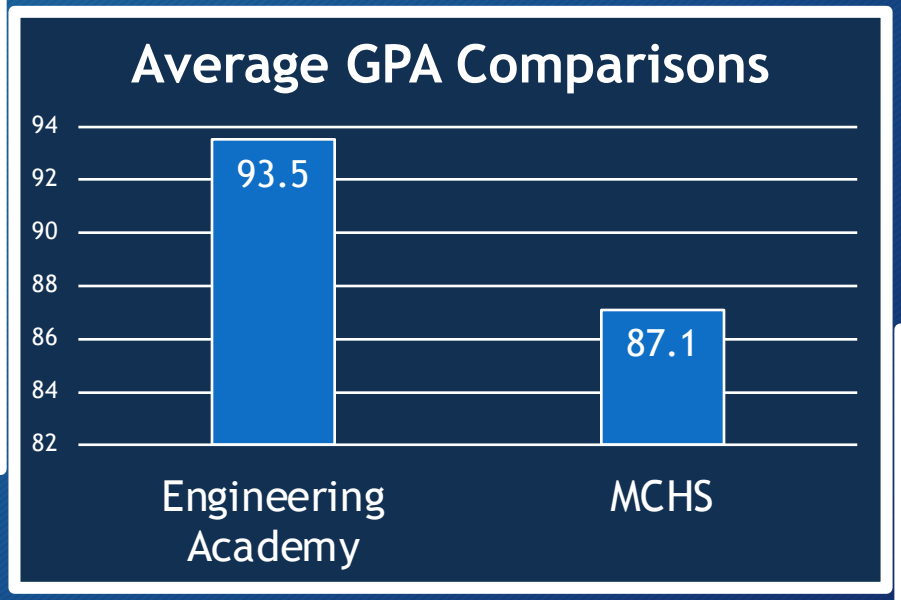
Academy OUTCOME Snapshot

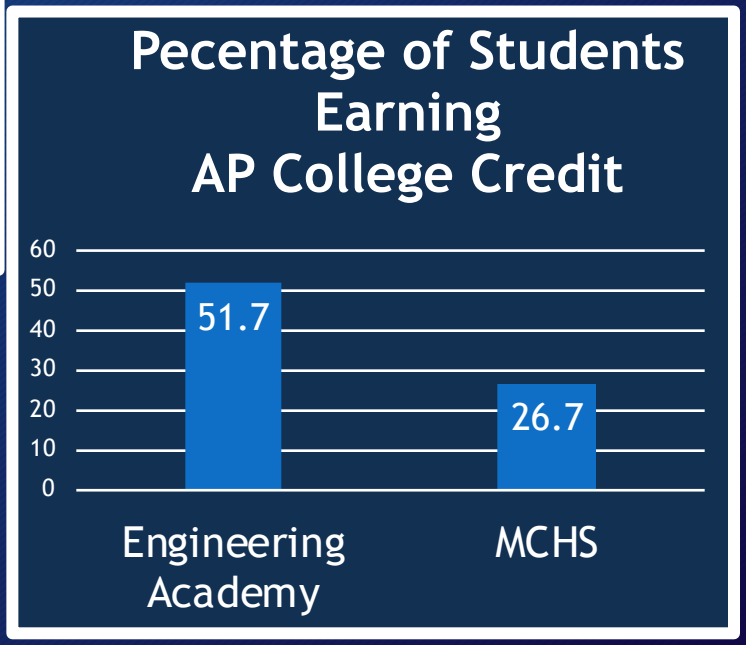
DATE COLLECTED:	2017-2018 (Current)		2016-2017		2015-2016		2014-2015	
	Academy-Level	Whole School-Level	Academy-Level	Whole School-Level	Academy-Level	Whole School-Level	Academy-Level	Whole School-Level
On-time progression – appropriate credits per grade level; retention; percentage with failing grades	100%	98.30%	100.0%	98.0%	100.0%	95.8%	100.0%	95.4%
GPA	93%	87.30%	93.5	87.1	91.8	87.3	92.4	87.5
Standardized tests; EOC; state tests - % proficient or above (or other identified benchmark) - Math	100%	67%	100.0%	54.7%	100.0%	75.3%	100.0%	38.9%
Standardized tests; EOC; state tests - % proficient or above (or other identified benchmark) – English	100%	71%	91.0%	73.1%	96.6%	70.3%	91.2%	72.0%
Standardized tests; EOC; state tests - % proficient or above (or other identified benchmark) – Science	100%	82%	100.0%	84.7%	98.8%	72.6%	98.7%	82.2%
Standardized tests; EOC; state tests - % proficient or above (or other identified benchmark) – Soc Studies	100%	80%	100.0%	81.4%	98.0%	82.6%	92.3%	80.1%

Student Assessment - Highlights

NSOP 9







ACADEMY OF ENGINEERING
MADISON CENTRAL HIGH SCHOOL
EST. 2013

Making a Difference!

Student Assessment - Highlights

NSOP 9

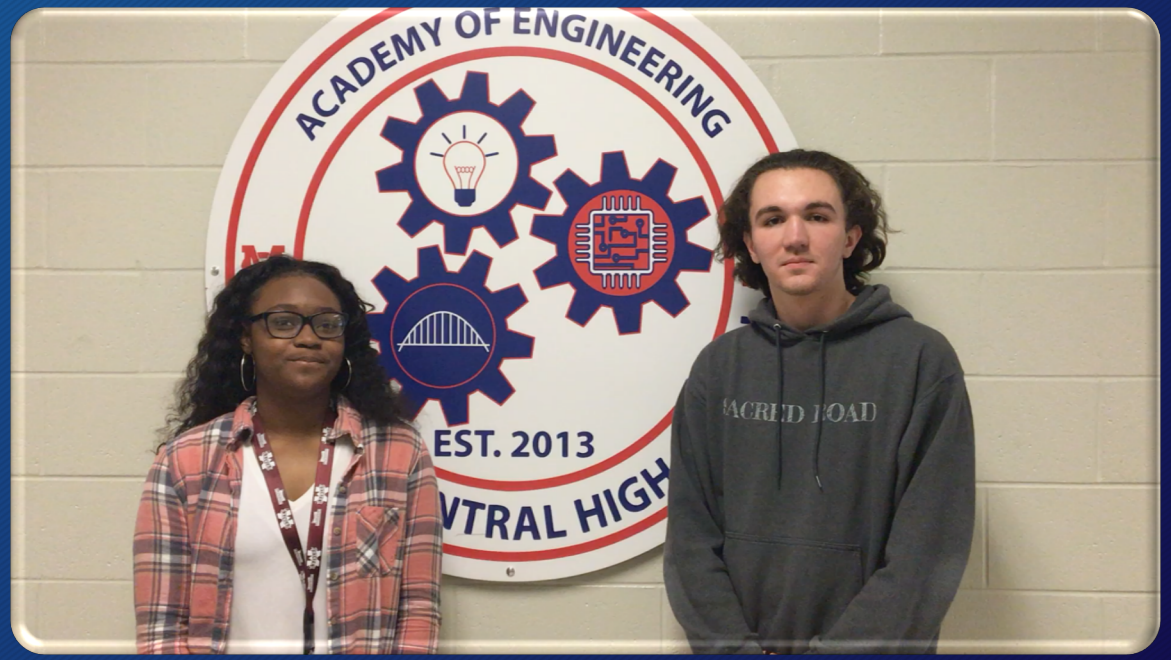
- 9 students earned credit for ENG 100 Introduction to Engineering course at the University of Mississippi
- 100% of our students have served in leadership positions throughout the school by the time they are seniors
- 100% enrollment in post-secondary education - (2017 – 100% Engineering, 2018 – 86% Engineering & 14% STEM related fields)
- 2017 graduates (12) earned of $800,000 in college scholarships
- 2018 graduates (14) earned over $1,900,000 in college Scholarships

Certifications

NSOP 9

Autodesk Inventor User Certification

- 100% 10th-12th graders certified, 2017
- Offer certification every 2 years

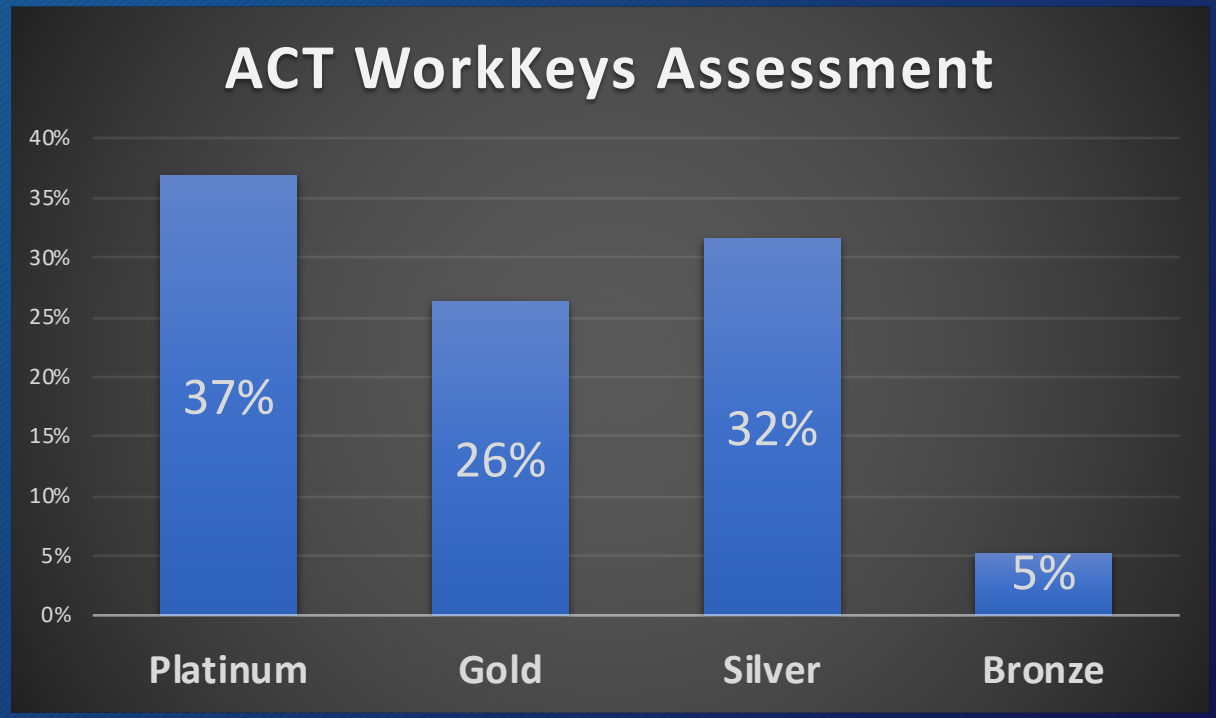


Certifications

NSOP 9

ACT WorkKeys

- Local Industry asked for
- This year was supported and funded by Madison County Economic Development Counsel



167 EMPLOYERS IN MADISON COUNTY RECOGNIZE OR RECOMMEND THE ACT WORKKEYS NCRC

Students are Inspired

NSOP 9

John A. designs and builds lamps

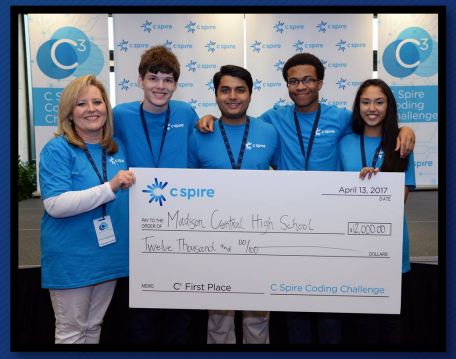
Matthew B. Blacksmithing

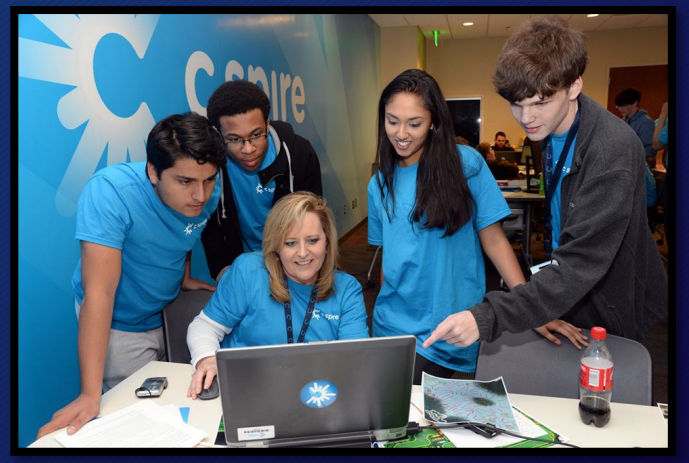
Andrew S. welds in his home garage

Branden L. designs/builds custom folding ping pong table

Student Accomplishments

- International Science and Engineering Fair (2017, 2018)
- Beach Outfalls challenge ($3,000 prize)
- National Coalition for Women in Information Technology (NCWIT) – Aspirations in Computing Awards ($500 MSU scholarship) (7 student and 2 teacher awards)
- Cspire ($12,000 1st place-2017, $6000 2nd place-2018)
- University of Mississippi Intro to Engineering credit (9 students have earned credit 2017, 2018)



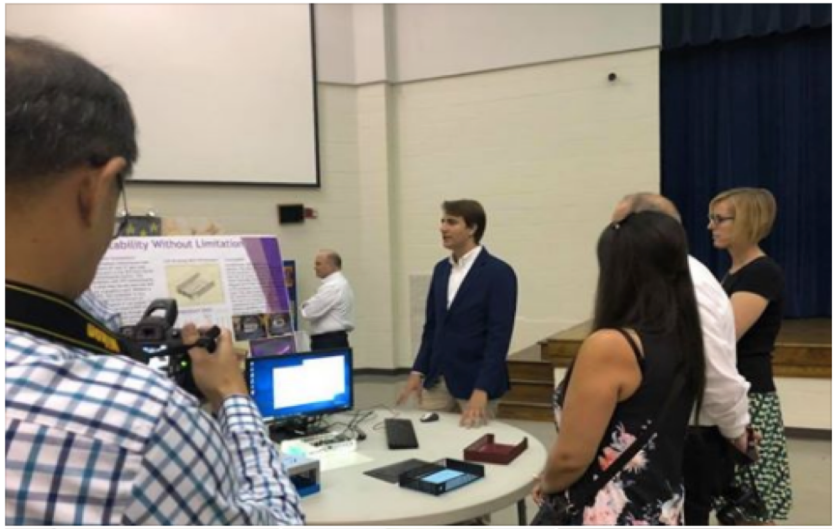


What Parents Say…

NSOP 9

Angel Caraway Wheatley is with Will Wheatley at Madison Central High School (Mississippi).
May 6 at 5:17pm · Madison ·

So proud of Will Wheatley for developing (by himself and with Mrs Robinson) a miniature computer / 3 D printed case that won't overheat despite hours upon hours of use. I can't say enough praise about the Engineering Academy at MC and I especially cannot say enough thanks to Mrs. Michelle Fleming Robinson ...she has been a complete game changer in Wills's life and career! She is an AMAZING CARING teacher! Please tell her for me if you see her!



Heather Grovich
May 3 at 8:54pm ·

So proud of my Nick and his awesome friends for winning the engineering 'Innovator of the Year' award for their senior cochlear implant case presentation. They identified a problem with the original cochlear implant case that is manufactured, came up with several prototypes, tested them, spoke with doctors who work in the field, and came up with a case that is top notch! Cannot say enough great things about the Engineering Academy at MC. Mrs. Robinson has been a mentor, a friend, and sometimes a second momma to my Nick. So grateful for her investment of time and love (and a few swift kicks along the way too 😜) in my boy ❤️

NSOP 9: Student Assessment

Sustainability

NSOP 10: Sustainability (10 pts)

Future of Academy Design

NSOP 10

- **<u>This year and next year</u>**
  - Identify and specifically invite students from 8th and 9th grade through their math teachers
  - Implement more IED classes at Rosa and MC for next year
  - Identify and invite another engineering teacher and more cohort teachers
  - Increase visibility of academy through multimedia academy promotions, newsletters, twitter, etc.
  - Seek more mentoring, internship opportunities for our students.
  - Continue to improve instruction and EOC score

Future of Academy Design

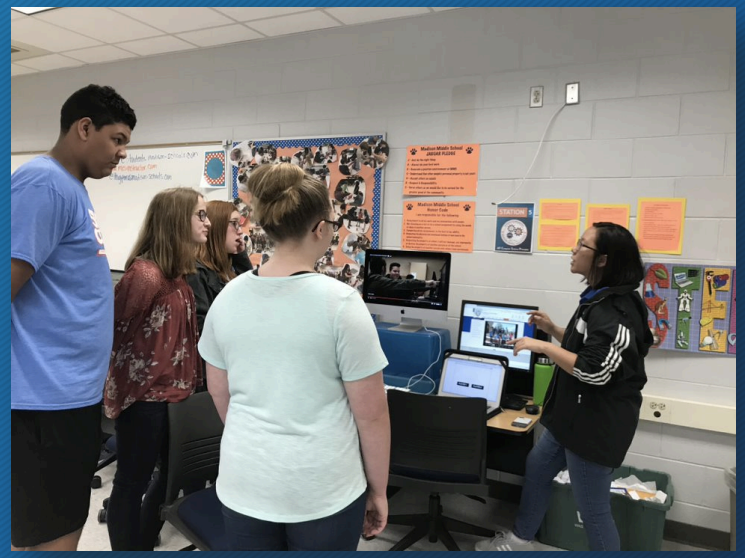
NSOP 10

- **2-5 years**
  - Investigate adding more choice engineering electives to 11th grade. Consider Computer Integrated Manufacturing (CIM) and Civil Engineering and Architecture (CEA).
  - Add another engineering classroom to the engineering wing with shared workspace. – Renovations and enhancements to provide additional space.
  - Investigate adding other industry certifications to the program.

Sustainability

NSOP 10

- Changes in faculty and administrations
- Recruiting efforts



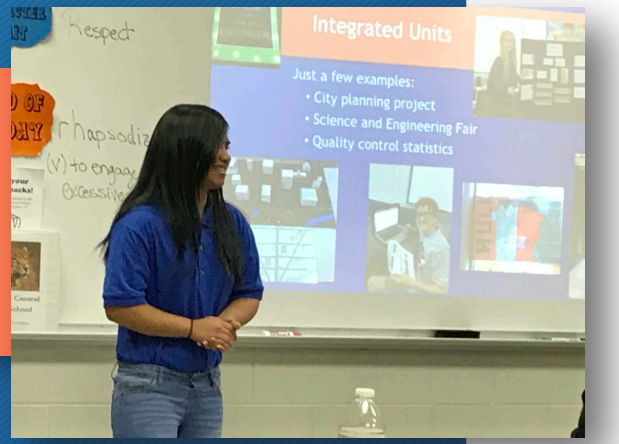
NSOP 10: Sustainability

Audit Day

Principles of Engineering
ACADEMY OF ENGINEERING
MADISON CENTRAL HIGH SCHOOL
EST. 2013
Welcome

PLTW
Madison Central Engineering Academy

Audit Day



Madison Central High School
NCAC Audit Agenda
December 6, 2017

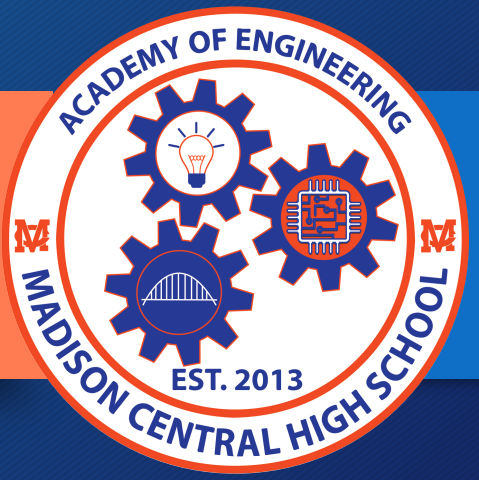
7:40 – 8:00	**Breakfast** *Engineering Lab CL2*
8:00 – 8:45	**Overview of Madison Central High School and the Academy of Engineering** *Engineering Lab CL2*
8:45 – 9:15	**Faculty Interview** *MCHS Conference Room*
9:15 – 9:25	Break
9:25 – 9:55	**Advisory Board Interview** (one reviewer) *MCHS Conference Room* **Academy of Engineering Tour** (one reviewer)
9:55 – 10:25	**Student Interview** *MCHS Conference Room*
10:25 – 10:55	**Reviewer Work Time** *MCHS Conference Room*
10:55 – 11:40	**Discussion and Debriefing** *MCHS Conference Room*

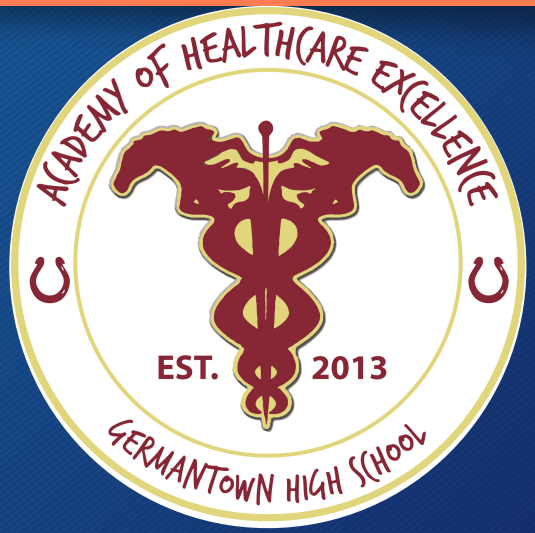
Results

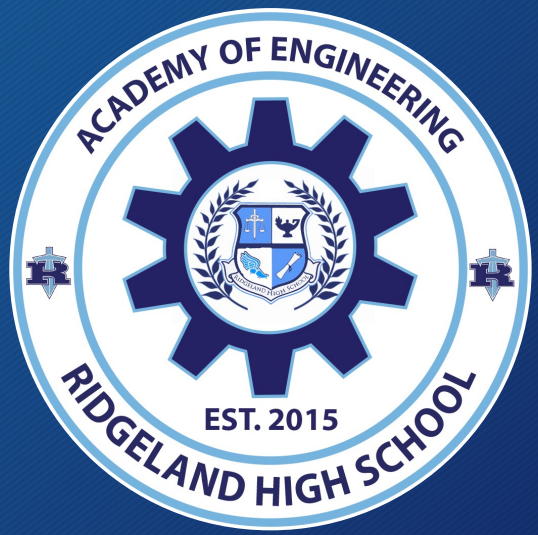
Model Academy!

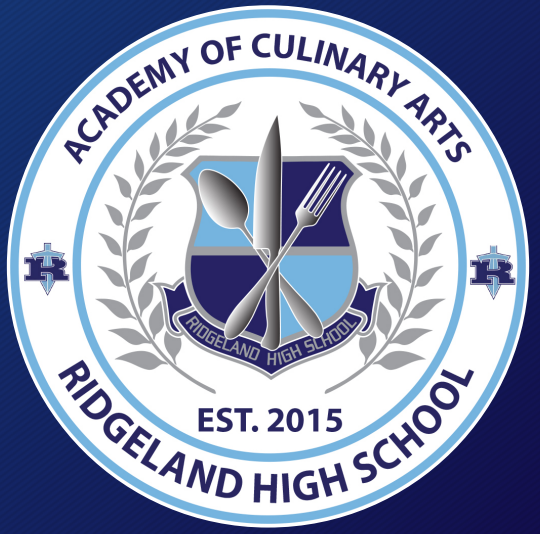
Madison County Schools - Home of the first Model Academies in Mississippi

Madison County Schools



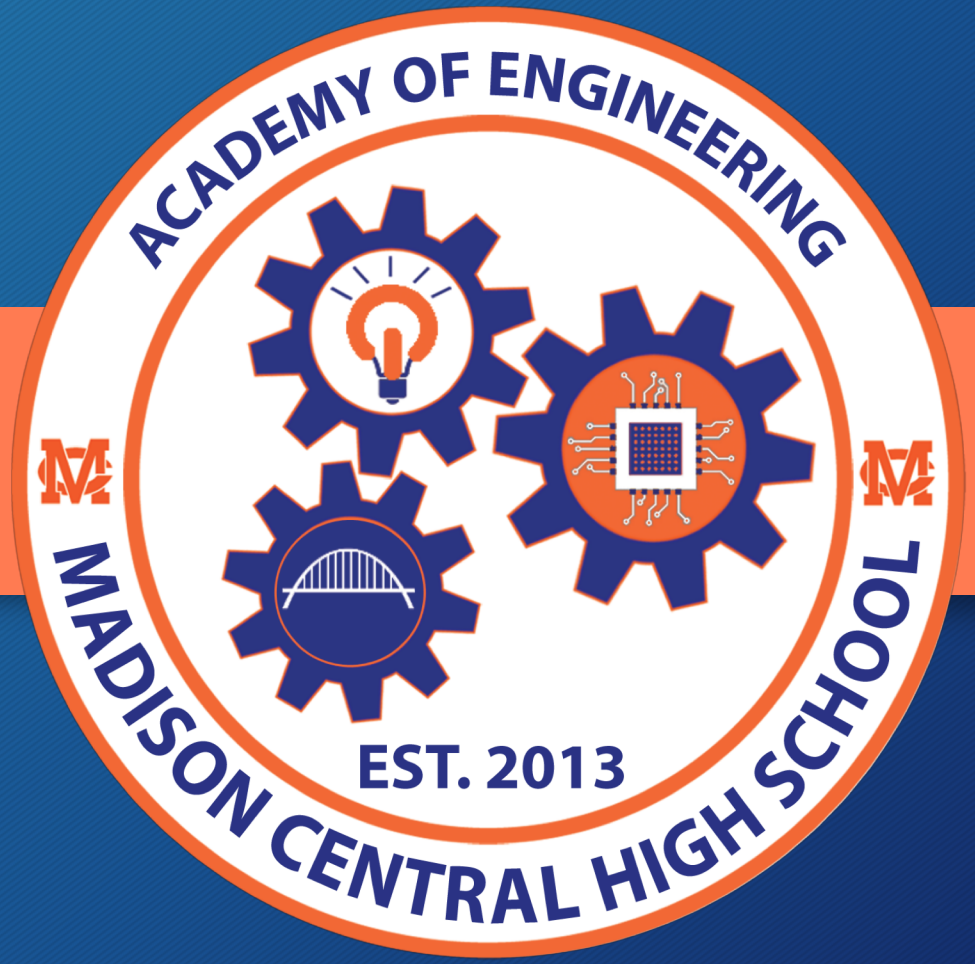






Questions

ABOUT US



www.madison-schools.com/engineering

END of NCAC Presentation