

Research Triangle Materials Science Research & Engineering Center: Programmable Assembly of Soft Matter



SENSOR Saturday Academy

Student Engineers Network – Strengthening Opportunities in Research (SENSOR) Saturday Academy

What? Hands-on education program to encourage careers in science and engineering by engaging 8th grade underrepresented minority students in materials science and water quality testing.

Goals? • Introduce students to careers in engineering and research.

- Teach engineering design by applying sensors to water quality testing.
- Create network for pursuit of advanced degrees in science and engineering.

Who? Students entering 8th grade. Instructors from Duke and NCSU engage students in materials-related engineering design activities, sensor experiments and mathematics exercises.

When? 12 Saturday sessions (Sep- May), plus field trip to Eno River State Park.

Where? Duke University Campus.



SENSOR Saturday Academy Staff

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SENSOR Saturday Academy

Typical SENSOR Saturday Academy Schedule

9:00am – 10:00 am	Arrivals, Continental Breakfast, & Icebreakers/Games
10:00am – 11:00am	Period I - Lecture
11:00am – 12:00noon	Period II - Activity
12:00noon – 1:00pm	Lunch
1:00pm – 1:45pm	Period III - Enrichment
2:00pm	Depart for Home (Journal Assignment HW)

We learned about:

- Engineering Design Process
- Types of Engineers
- Nanotechnology
- Water Quality
- Sensors
- Math

Engineering Design: Snack Attack!



Active Learning: Nanotechnology



Experiment: Testing Water Quality



Field Trip: Duke University Mesocosm

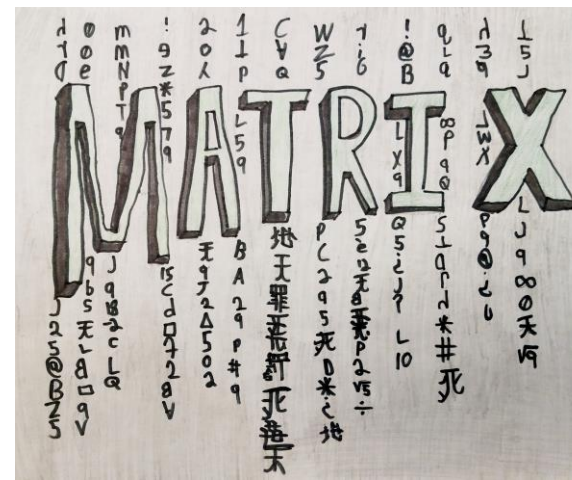
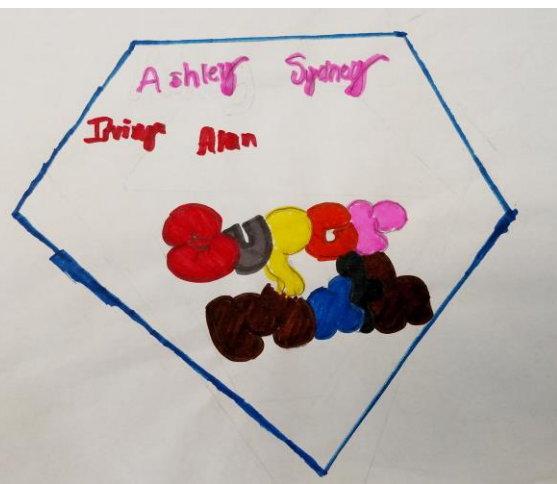
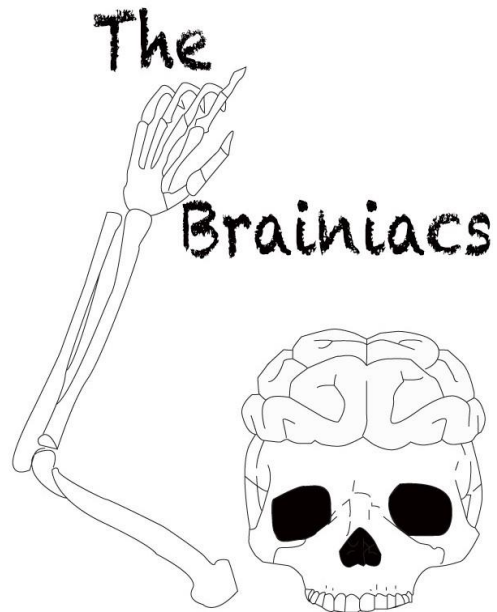
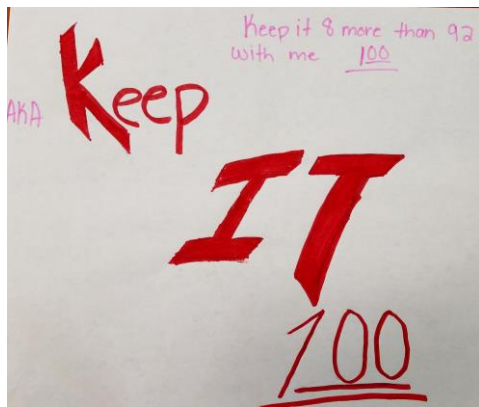
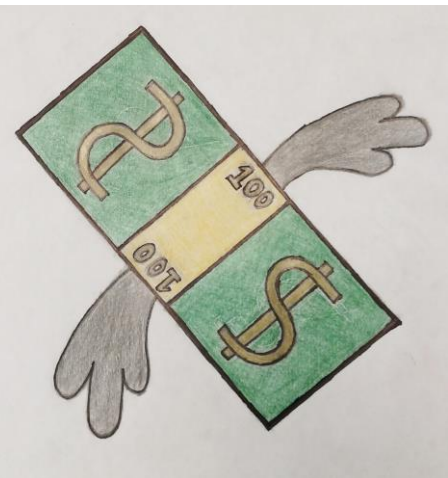


Experiment: Temperature Probe



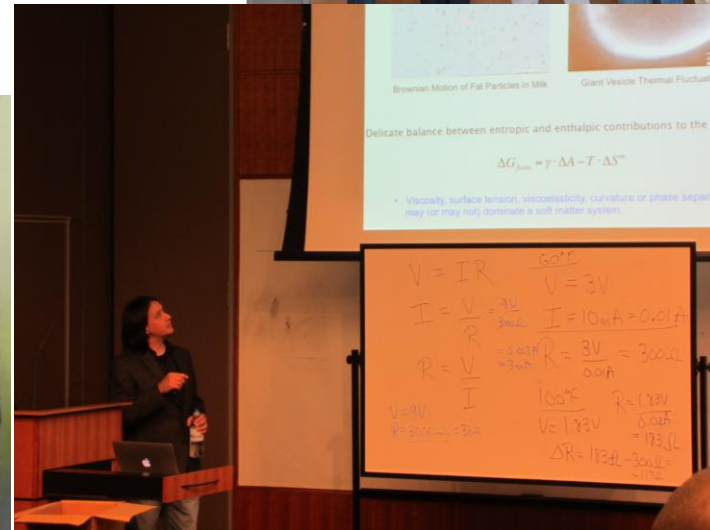
Engineering Design: Shake Things Up!





SENSOR Saturday Academy 2015-16





SENSOR Saturday Academy

Academy Session 1: Introduction to Engineering

Lecture – What is Engineering?

Activity – Engineering Design Process, “Snack Attack”

Enrichment – Researcher Conversation with Adrienne Stiff-Roberts (BWF SSEP PI), Associate Professor, Electrical and Computer Engineering, Duke University

Academy Session 2: Introduction to Nanotechnology

Lecture – What is Nanotechnology?

Activity – Engineering Design Process, ASK (Nanotechnology Web Search and Presentation)

Enrichment – Research Lab Tour

Academy Session 3: Introduction to Water Quality

Lecture – What is Water Quality?

Activity – Engineering Design Process, Mystery Water (Identify the Water Source)

Enrichment – CEINT Mesocosm Facility Tour with Ben Colman, Postdoctoral Associate, Biology/CEINT, Duke Forest

Academy Session 4: Introduction to Temperature Probes

Lecture – What is an Electronic Temperature Probe?

Activity – Temperature Probe Lab Experiment

Enrichment – Researcher Conversation with Nick Carroll, Assistant Research Professor, Biomedical Engineering, Duke University

Academy Session 5: Temperature Probe Math Extension

Lecture – Linear Equations

Activity – Lines of Best Fit (Describe Temperature Probe Readings)

Enrichment – Shared Materials Instrumentation Facility (SMIF) Tour with SMIF Staff, Duke University & Research Triangle Materials Research Science and Engineering Center (RT-MRSEC) Tour with MRSEC Graduate Students, Duke University

Academy Session 6: Engineering Design Activity

Lecture/Activity – Engineering Design Process, “Shake Things Up”

Enrichment – Engineering Design Process, Student Presentations of Results

Academy Session 7: Introduction to Conductivity Probes

Lecture – What is a Conductivity Probe?

Activity – Conductivity Probe Lab Experiment

Enrichment - Researcher Conversation

Academy Session 8: Conductivity Probe Math Extension

Lecture – Direct/Inverse Variations

Activity – Lines of Best Fit (Describe Conductivity Probe Operation)

Enrichment - Duke University Campus Tour

Academy Session 9: Engineering Design Activity

Lecture/Activity – Engineering Design Process, “Designing Knee Braces”

Enrichment – Engineering Design Process, Student Presentations of Results

Academy Session 10: Introduction to pH Sensor

Lecture – What is a pH sensor?

Activity – pH Sensor Lab Experiment

Enrichment – Researcher Conversation with MRSEC Graduate Students, Panel Discussion

Academy Session 11: pH Sensor Math Extension (April 9, 2016)

Lecture – Direct and Inverse Variations

Activity – Lines of Best Fit (Describe conductivity probe readings)

Enrichment – Duke Campus Scavenger Hunt

Academy Session 12: Engineering Design Activity (April 23, 2016)

Lecture/Activity – Engineering Design Process, Testing Water Quality at the Eno River State Park (Plan study to be executed during field trip)

Enrichment – Student Presentations of Testing Plans/SENSOR Saturday Academy Slideshow

Field Trip – Testing Water Quality at Eno River State Park in Durham, NC (April 30, 2016)

