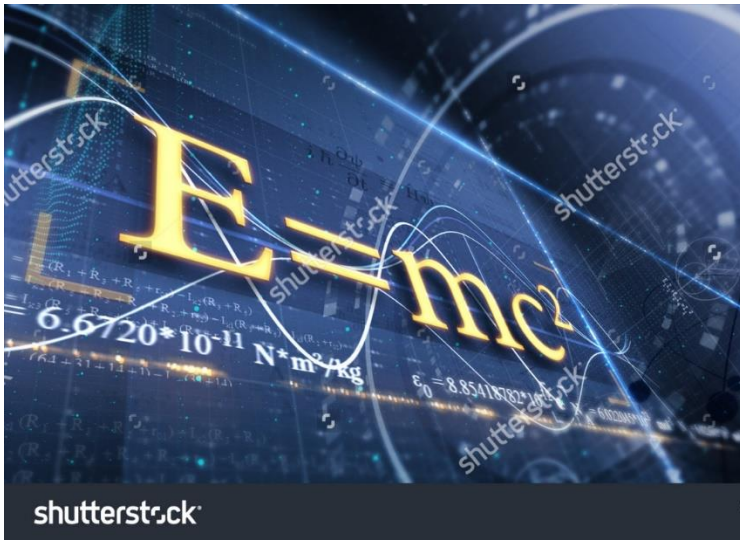
North Carolina School of Science and Mathematics

NCSSM Science

- Angular Momentum
- Torque & Moment of Inertia

Dr. Sam Wheeler
Physics Instructor



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What's Going to Happen?

- -Same mass-arms out?

- -Same mass-arms in?

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Make a Prediction

- Which object will make it down the ramp first?
- Why?

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Biology

- Anatomy and Physiology
- Classical Genetics
- Molecular Genetics
- Neurobiology
- Evolution
- Ecology
- Aquatic Ecology
- Evolution w/Advanced Topics
- Molecular & Cellular Biology
- Climate Change Biology
- Immunology
- AP Environmental Science
- AP Biology
- Research Experience in Biology
- Research in Biology

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Chemistry

Core:
- Inquiry Chemistry
- General Chemistry
- AP Chemistry
- AP Chemistry Advanced

Electives:
- Analytical
- Organic
- Computational
- Materials
- Medicinal
- Environmental
- Biochemistry
- Research Experience in Environmental Chem
- Research Experience in Nutritional Chemistry
- Research in Chemistry
- Research in Computational Science

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Physics

Core:
- General Physics
- Physics with Advanced Topics
- AP Physics C

Electives:
- Astronomy
- Astrophysics
- Galaxies and Cosmology
- Modern Physics
- Fluids, Optics, & Thermodynamics
- Research Experience in Physics
- Research in Physics

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NCSSM Online Science

- Honors Intro to Systems Thinking
- Honors Agricultural Biotechnology Solutions
- Honors Classical Genetics
- Honors Climate Change Biology
- Honors Energy and Sustainability
- Honors Epidemiology
- Honors Forensic Science
- Honors Earth Processes and Materials
- Honors Intro to Applied Chemistry & Engineering
- Honors Molecular Genetics
- Honors Nanotechnology & Research
- Research Process (Seminar)

courses (online and residential) are subject to change

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Other Unique Opportunities

- Mini-Term
- Seminars
- Clubs
- Competitions
- Professional Mtgs
- Student-run Journal

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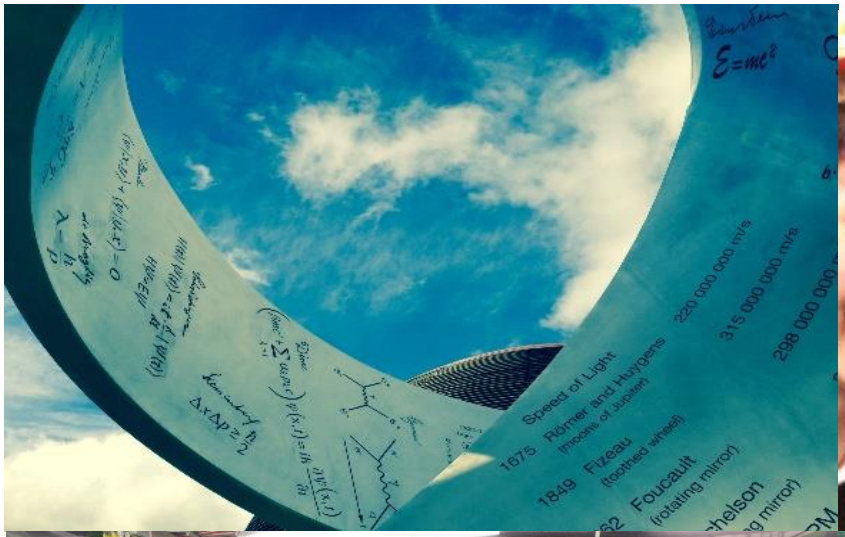

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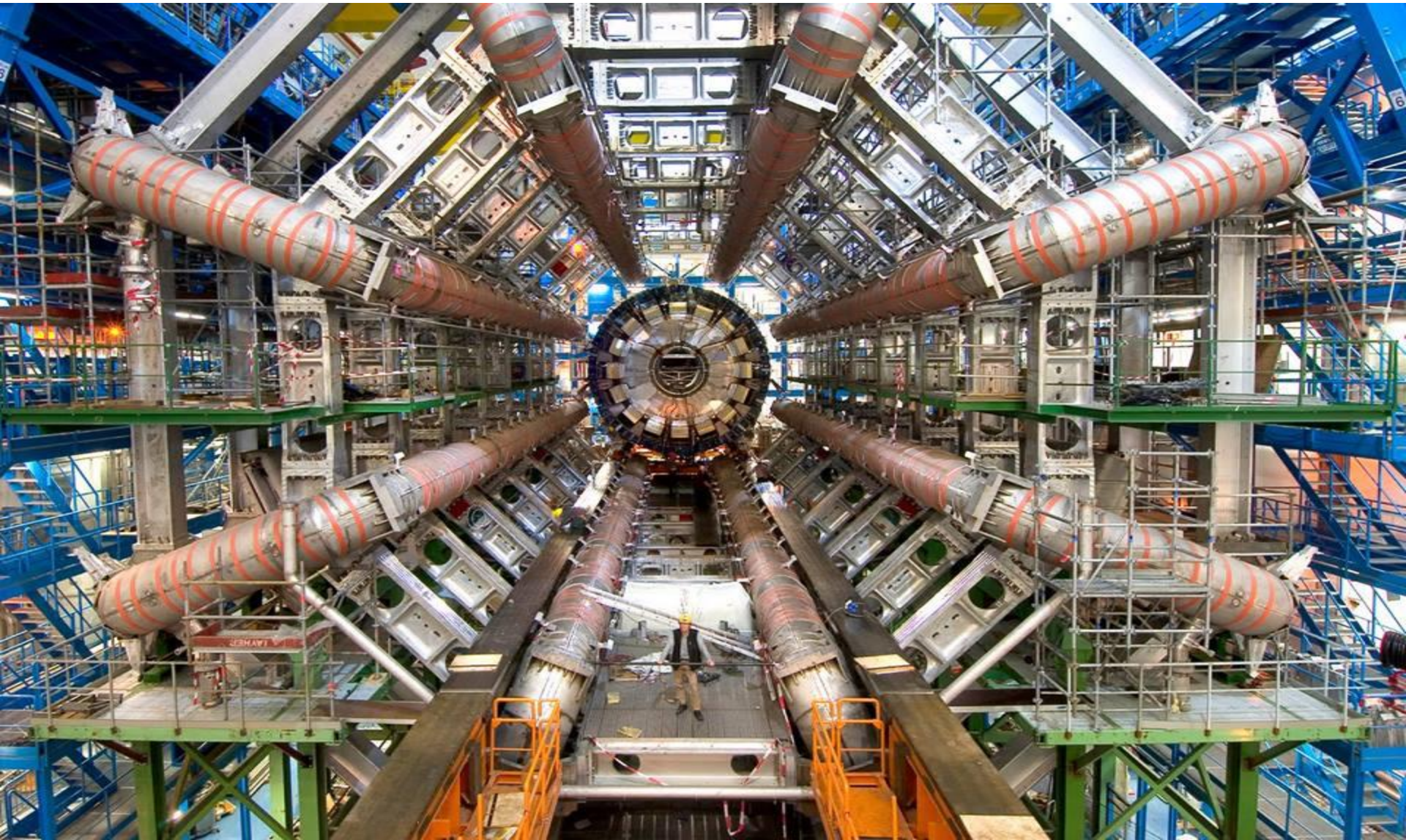

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Students -
NCSSM is different!
- Talk to adults
- Work much harder
- Engage in more hands-on learning
- Take responsibility for your learning
- Read the catalogue to understand our courses

Parents -
NCSSM is different!
- Transition to college
- Academic challenge
- Personal responsibility
- Independence
- Read the catalogue

http://www.mikemack.ca/

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NCSSM Mathematics

2017-2018

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Mathematical Power

[Mathematical power] denotes an individual's abilities to explore, conjecture, and reason logically, as well as the ability to use a variety of mathematical methods effectively to solve non-routine problems.

Curriculum and Evaluation Standards, p.5, National Council of Teachers of Mathematics, 1989.

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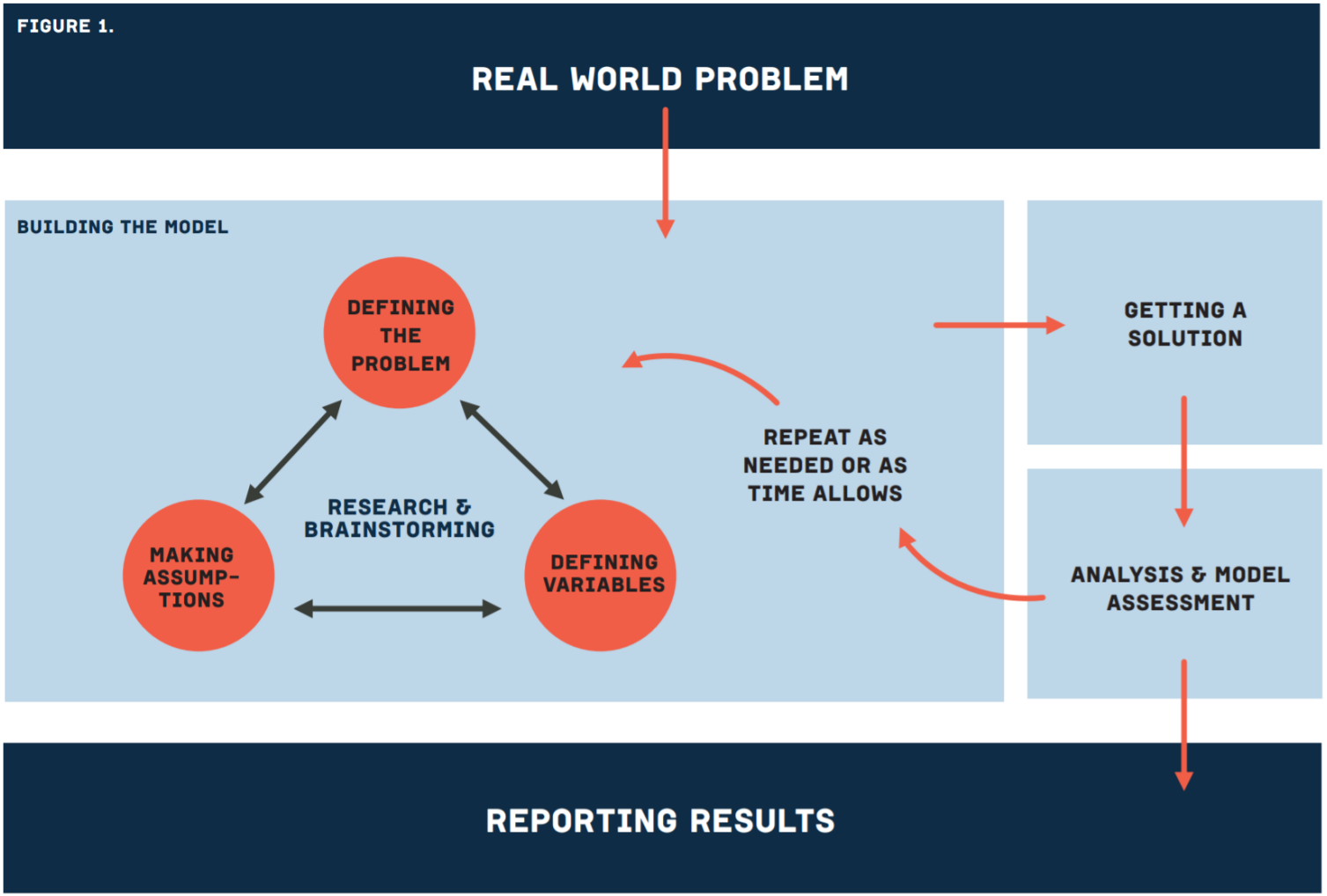
FIGURE 1.



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Precalculus

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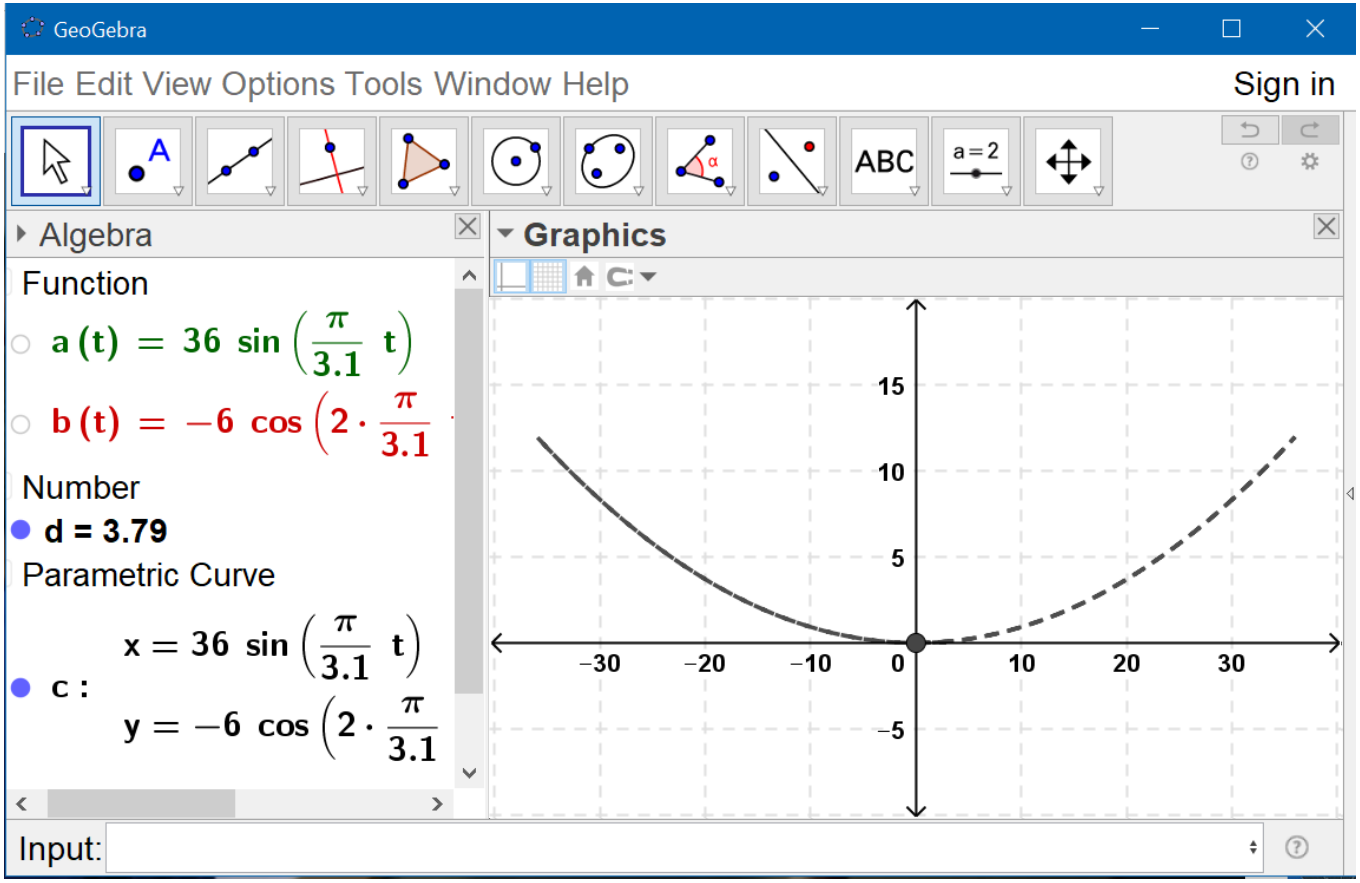

Precalculus

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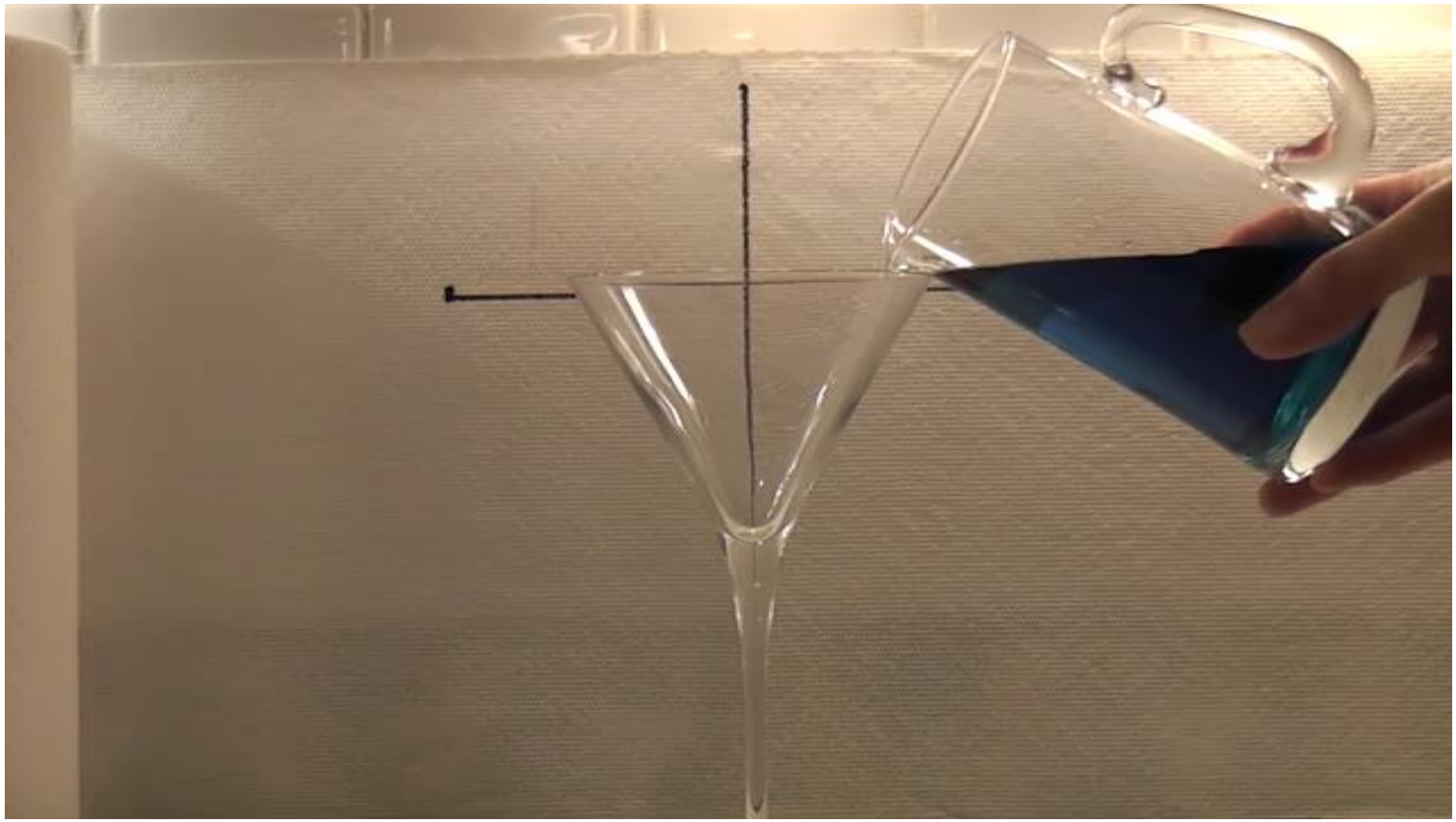

Calculus

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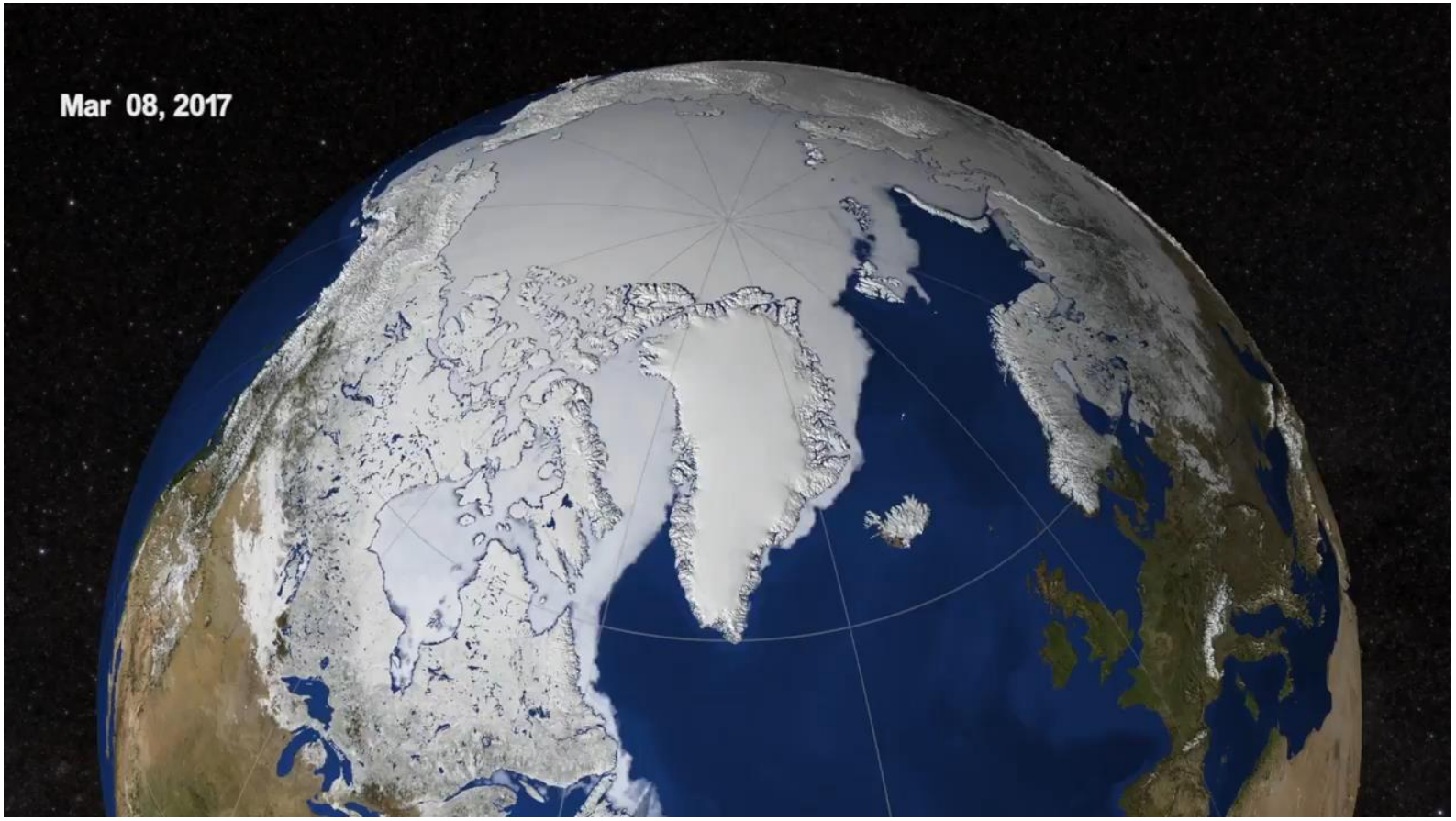

Advanced Probability Models

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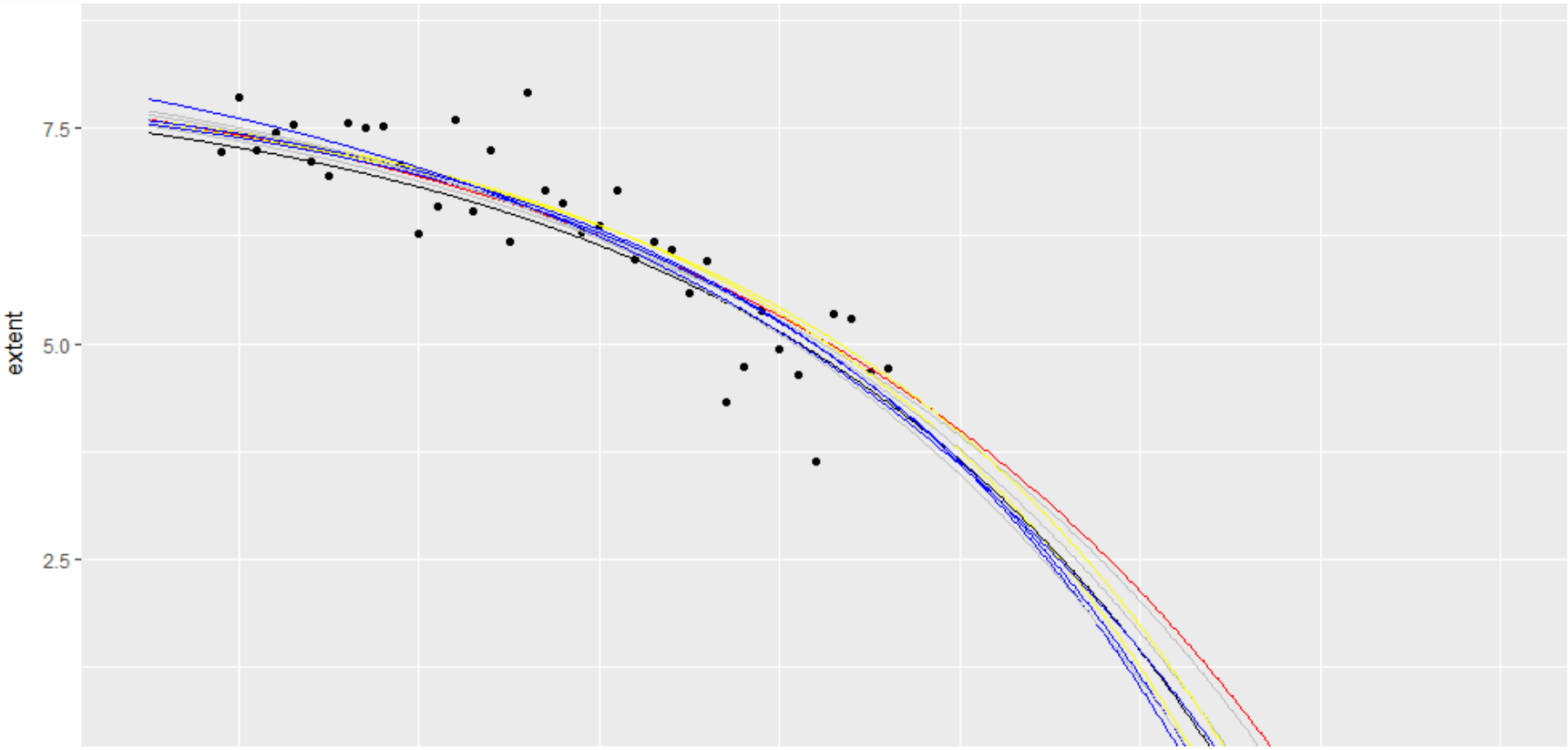

Advanced Probability Models

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Core Curriculum

- Algebra 3
- Precalculus with Modeling
- AP Calculus and/or AP Statistics

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Other Math Courses

Along with Precalculus w/ Modeling

- Statistics
- Finite Mathematics
- Advanced Mathematical Problem Solving

After Calculus

- Multivariable Calculus
- Complex Systems
- Structure & Dynamics of Modern Networks
- Research in Mathematics

Along with Calculus:

- Statistics with Advanced Topics
- Mathematical Modeling
- Modeling with Differential Equations
- Number Theory
- Group Theory
- Graph Theory & Introduction to Proofs
- Combinatorics & Game Theory
- Numerical Analysis
- Advanced Probability Models

North Carolina School of Science and Mathematics

Research in Mathematics

- **Research in Mathematics Mini-Term**
  Open to all interested students.

- **Research in Mathematics Trimester Course**
  Designed for students who have either completed Graph Theory & Introduction to Proofs or equivalent mathematical experience.

- **Summer Research in Mathematics**

- **Advanced Mathematical Topics**
  Year long research program working with professors from Duke University. This opportunity is available to students who excel in the Research in Mathematics Trimester Course.

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NCSSM Online Mathematics

- AP Calculus AB
- AP Calculus BC
- Explorations in Mathematical Modeling & Research
- Honors Applied Finite Mathematics with Biological Focus
- Honors Applied Finite Mathematics with Social Science Focus
- Honors Multivariable Calculus I with Applications
- Honors Multivariable Calculus with Applications

We challenge what's possible.

courses (online and residential) are subject to change

North Carolina
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and Mathematics

Special Opportunities

- **Math Club and Math Team**
- **Math Competitions**
  - Moody's Mega Math
  - Mandelbrot
  - HiMCM
  - State Math Contest
  - ARML
  - Off-Campus Contests
- **WISE**

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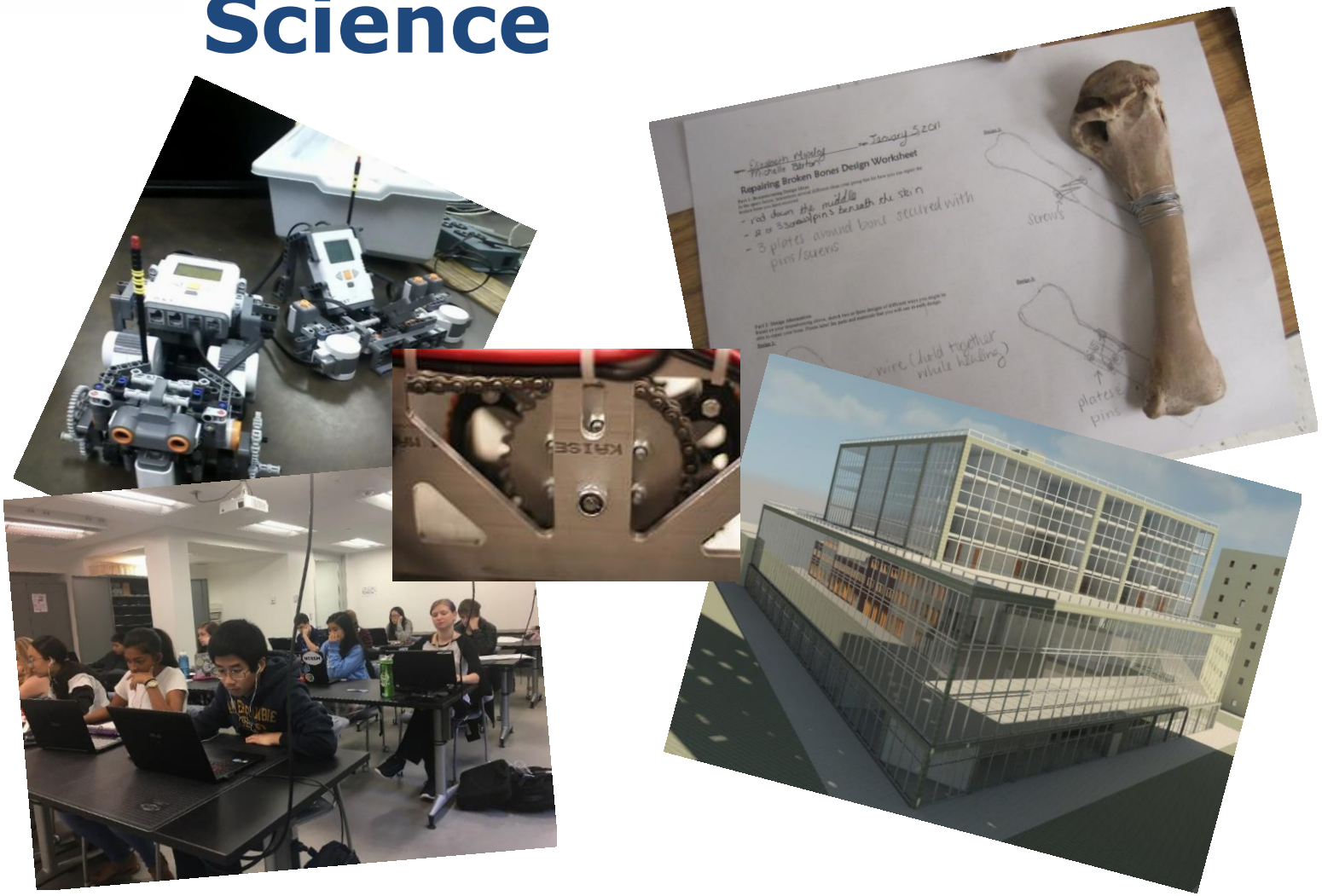
Department of Engineering & Computer Science



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Departmental Goals

- Familiarize Students with Engineering and Computer Science
- Prepare them for success in college programs
- Gain important, applicable skills
  - Design
  - Problem solving
  - Communication of ideas
- Some instances of college credit
  - Articulation and credit by examination with some UNC-system schools

North Carolina School of Science and Mathematics

Engineering and Computer Science Faculty

- Dr. Joe LoBuglio (Dean)
  - BS, Mechanical and Aerospace Engineering, Princeton
  - ME, Aeronautical and Astronautical Engineering, Stanford
  - PhD, Environmental Engineering, UNC-Chapel Hill
  - Saturn, Massachusetts Water Resources Authority, UNC Water Institute
- Mr. John Kirk
  - BS, Electrical Engineering, University of Kentucky
  - MEM, Washington University, St. Louis
  - McDonnell-Douglas, Boeing
- Dr. Letitia Hubbard
  - BS, Electrical Engineering, Georgia Institute of Technology
  - BS, Chemical Physics, Dual Degree, Spelman College
  - PhD, Biomedical Engineering, Duke University
  - Medtronic

North Carolina School of Science and Mathematics

Engineering and Computer Science Faculty

- Mr. Larry Myers
  - BS, Electrical Engineering, Purdue University
  - MS, Electrical Engineering, Purdue University
  - Bose, Sony-Ericsson, GE Hitachi Nuclear Energy
- Mr. David Bryan
  - Manager, Peter T. Haughton Innovation and Fabrication Laboratory
  - BA, Communication Studies, UNC – Chapel Hill
  - MID, North Carolina State University
  - ShopBot Tools
- Dr. Garrett Love
  - BS, Civil and Environmental Engineering, Duke
  - MS, Civil and Environmental Engineering, Duke
  - PhD, Civil and EnEnvironmental Engineering, MIT

North Carolina School of Science and Mathematics

Engineering and Computer Science Faculty

- Dr. John Morrison
  - AB, Mathematics, Indiana University
  - PhD, Mathematics, University of Texas
- Mr. Keethan Kleiner
  - BS, Computer Science, UNC-Chapel Hill
  - MS, Computer Science, UNC-Chapel Hill
  - Automated Insights
- Rex Jeffries
  - BS, Electrical Engineering, NC A&T State University
  - MS, Electrical Engineering, NC A&T State University
  - PhD, Biomedical Engineering NC State University and UNC-Chapel Hill
  - Nortel Networks

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Engineering Courses - Introductory

- Mechanical Engineering
- Electrical Engineering
- Civil/Environmental Engineering
- Biomedical Engineering
- Architecture
- Introductory Robotics
- Fundamentals of Engineering
- History of Engineering and Technology
- Engineering the Modern
- Research Experience in Engineering

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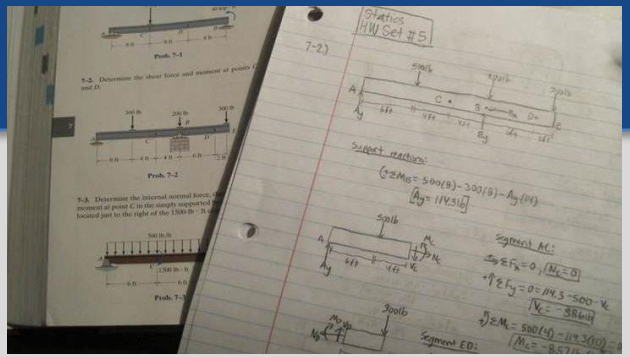
Engineering Courses - Advanced



- Statics
- Biomedical Instrumentation
- Circuits
- Research in Engineering

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Computer Science Courses

- Introductory
  - Web Development
  - Programming with Engineering Applications
  - Introduction to Robotics
  - Databases
- Intermediate
  - Procedural Programming
- Advanced
  - Java
  - Advanced Java
  - Data Structures

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Online Courses

- Honors Aerospace Engineering
- AP Computer Science Principles
- Honors Biomedical Engineering
- Honors Civil & Environmental Engineering

courses (online and residential) are subject to change

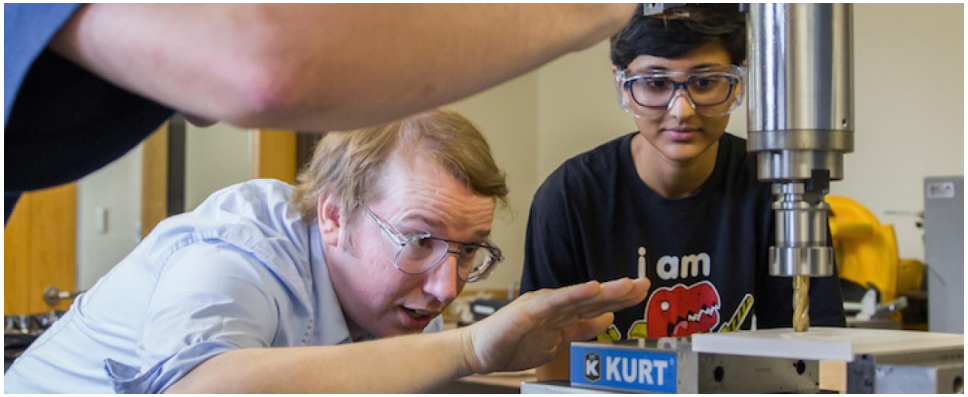
North Carolina School of Science and Mathematics

Peter T. Haughton Fabrication Lab

A comprehensive lab, bringing capabilities from woodworking to metalworking, plastics, and electronics

- 3D Printing
- Laser Cutting
- 3-Axis CNC Mill and Lathe
- Large and small formate CNC Router
- CNC embroidery machine
- Hand bench-top tools
- Electrical work station
- CAD/CAM Training

Shifted schedule to accommodate students



"It's one of the best labs I've ever seen, it compares to the best graduate-level lab."

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Student Feedback

"I, not only, learned more about the field of biomedical engineering, but I learned how to develop a research project from beginning to end." - Kelly Kimble '15

"The weekly hand-on experiments and projects were intriguing!"

"Every week I felt like an engineer, applying parts of physics, math, chemistry, and biology to help solve real world problems."

"Biomedical engineering was like no other class I had taken before. It was truly taking information we learned and applying it to solve complex problems
-Ashlyn Stackhouse '15

"Taking your class showed me a world of physics and … how to approach practical problems and how to solve them … I think I finally get it, the appeal behind being able to build something and design each component with what you know."

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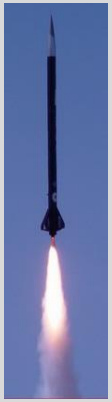
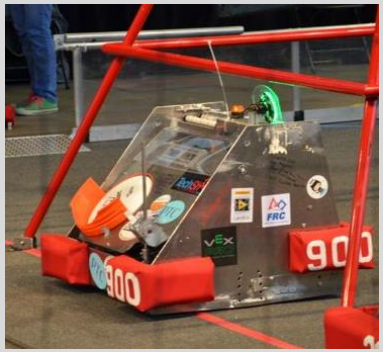
Opportunities Outside the Classroom

- Clubs:
  - Computer Science Club
  - FIRST Robotics Competition
  - National Society of Black Engineers
  - Technology Students Association
  - Durham Area Rocketry Team/TARC
  - Drone Club
  - Zero Robotics Club





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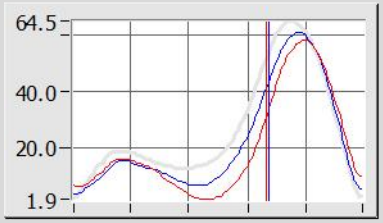
Opportunities Outside the Classroom

- Special Study Options
  - Tissue Engineering
  - Biomechanics Research
  - Graphic Design
  - 3D Printer Design & Construction
  - Rocket Science
  - CAD Analysis
  - Mechatronics



- Off-Campus Internships
  - Interns at IBM, SAS

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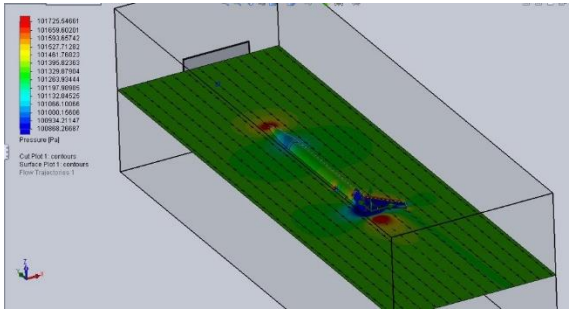
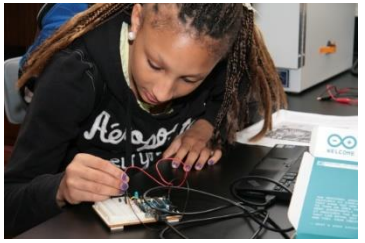
Mini-Term Opportunities

- Computer Graphics
- Biomechanics of Human Movement
- Programming the Arduino Microprocessor
- Electronic Instruments
- Architecture in Berlin
- NASCAR Engineering





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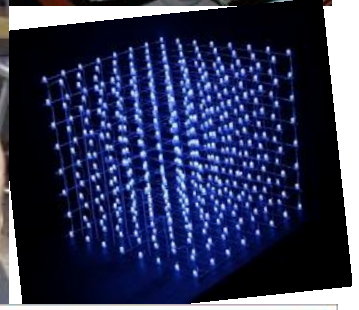
Mini-Term Opportunities

- Computer Systems
- Webpage Construction
- x86 Assembly Language
- Cryptography
- Android Apps



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Engineering in Action

Robotics Vision System
https://www.youtube.com/watch?v=4KlYdCBdjEg

Rocket Roll Stabilization
https://drive.google.com/file/d/0B1O6UeYfqiJ-enp5NWVlZHR5WkU/view?usp=sharing

Automotive Engineering
https://drive.google.com/file/d/0BzCks-xycNL5QlNOVnNVc3E2Y2c/view?usp=sharing

Bionic Hand
https://drive.google.com/file/d/0BxZE5hKd2jp3M29OUkFvWDMybUE/view?usp=sharing


Welcome to the
NCSSM journey
. . .
Καλώς Ήρθατε!
NCSSM
HUMANITIES

North Carolina School of Science and Mathematics

Creating a new generation of leaders

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The Human Story

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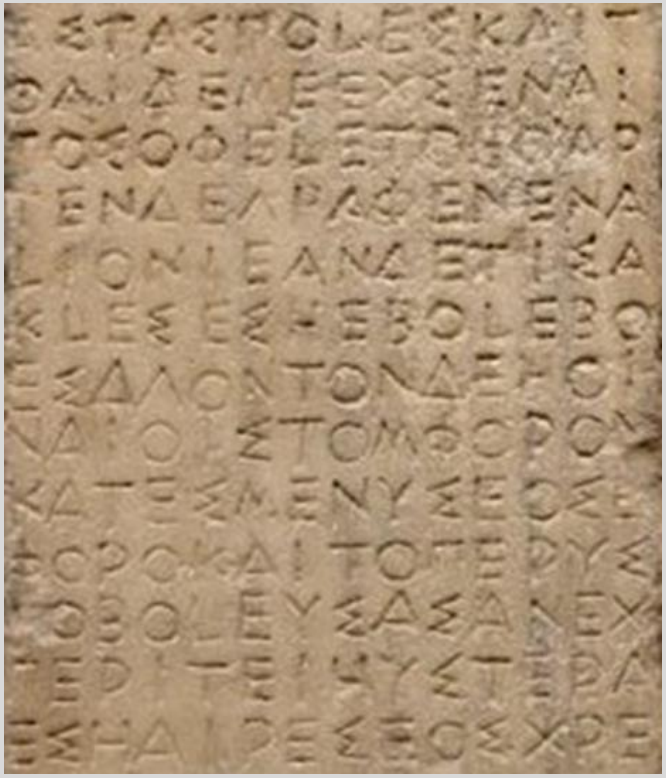
NCSSM Humanities

- Literature
- History
- Social Sciences
- World Languages



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NCSSM Humanities

- Fine Arts
  - Music
  - Drama
  - Creative Writing
  - Visual Arts

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Weaving the Cultural Fabric

- Interdisciplinary Cultural Studies
  - *Making connections* between and among literature, history, the visual arts, popular culture, economics, politics, literary theory, and historiography
  - *Academic Writing*

North Carolina School of Science and Mathematics

Weaving the Cultural Fabric

- **American Studies** (all juniors)
- **Senior courses:**
  - *African Studies*
  - *Asian Studies*
  - *British Literature/Culture*
  - *East-West Studies*
  - *Modern World Fiction*
  - *Philosophy and Literature in the Twentieth Century*
  - *Southern Literature/Culture*
  - *Western Civilizations*
  - *Western European Cultural Studies*
  - *Special Topics (Shakespeare Now; Literature of the American West; STEM and the Stage)*

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Languages and Cultures

- Chinese
- French
- Japanese
- Latin
- Spanish

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Global Understanding
(in Intermediate Chinese classes)

- Shared virtual classroom with the Hangzhou Foreign Languages School in China
- Weekly interactive video class meetings
- Annual in-person cultural exchange visits
- Global Understanding Video

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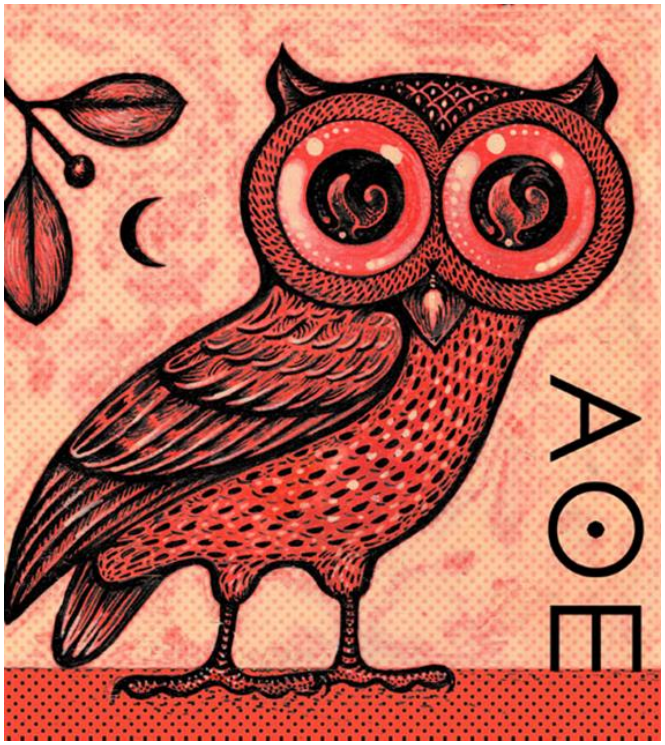
Electives



- *Economics*
- *Entrepreneurship*
- *Psychology*
- *Sociology;*
  Medical Sociology
- *International Relations*
- *Black Studies*
- *Women's Studies*
- *Topics in History/Social Science*
  - *The Immigrant Experience Today: What Is an American?*
  - *The 2016 Presidential Election*

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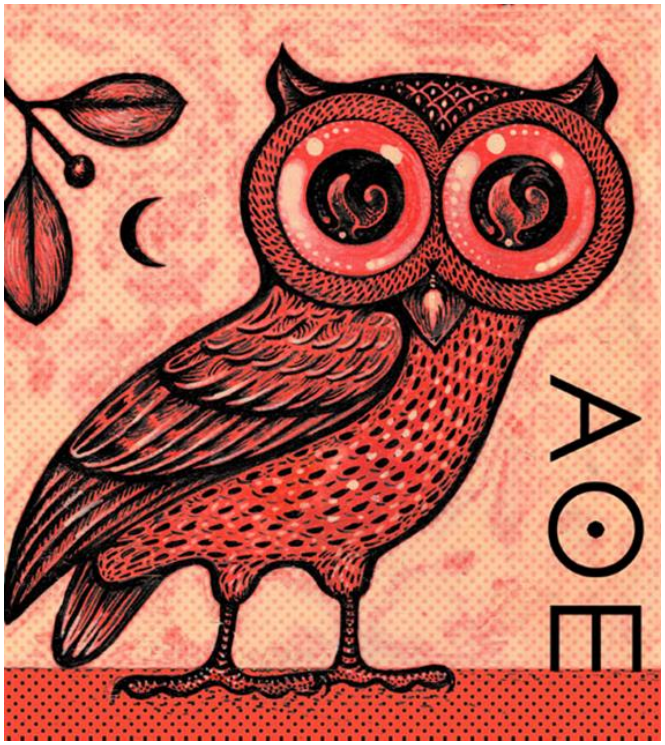
Electives



- *Film Studies*
- *Classical Myth*
- *Poetry Writing*
- *Fiction Writing*
- *American Popular Song*
- *History of Western Music*
- *Twentieth-century Music History*

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Fine Arts Electives

- *Orchestra*
- *Wind Ensemble*
- *Chorale*
- *Jazz Performance Workshop*
- *Classical Piano and Guitar: Theory and Practice*
- *Music Theory and Composition*
- *Audio and Digital Music Recording*

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Fine Arts Electives

- *Theater Performance Workshop*
- *Drawing*
- *Painting*
- *3D Design*
- *Open Studio*
- *Darkroom Photography*

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Research

- *Research Experience in the Humanities*
- *Advanced Research in the Humanities*
- *Research Experience in the Fine Arts*
- *Summer Research in the Humanities*

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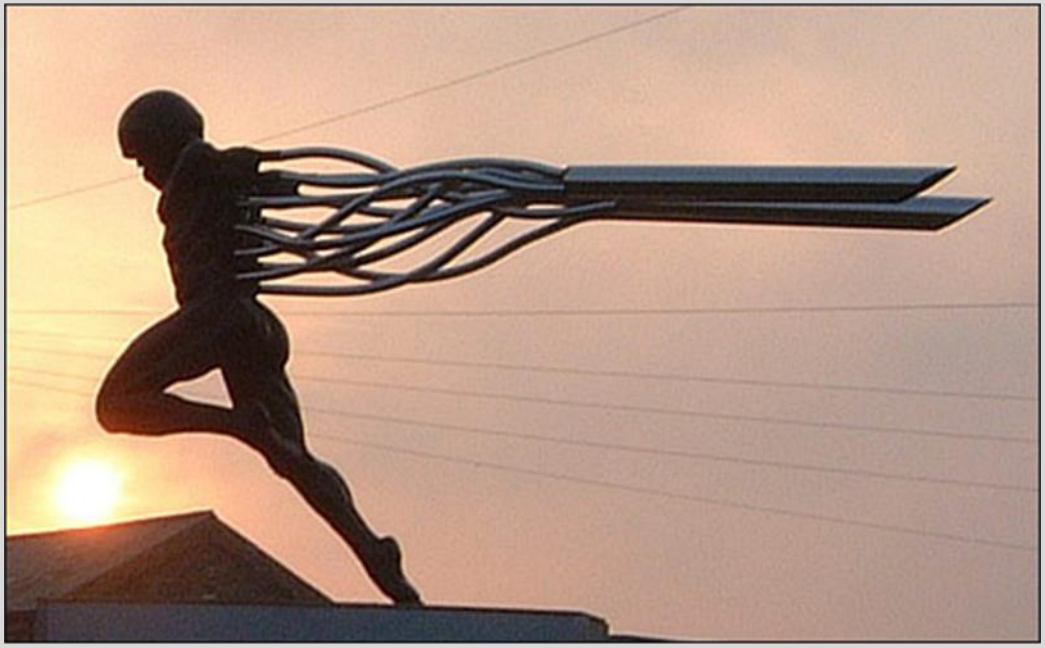
Online Courses

- *Ecocriticism*
- *International Relations*
- *21st Century Media Studies*
- *Western Political Thought*
- *Introduction to Entrepreneurship*
  (a new hybrid course)



courses (online and residential) are subject to change

North Carolina
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Mini-Term Courses

- *The New Deal in North Carolina*
- *Global Brigades: Building Wells and Building Communities in Honduras*
- *Teaching Kids to Code*
- *Tennessee Williams: Orpheus of the American Stage*
- *Animal Rescue SOS*
- *Oral History and Documentary Film*
- *Shakespeare's Plays*
- *The Civil War: The Western Theatre*

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Mini-Term Courses

- *The West Wing and American Politics*
- *POTUS: Popular Media Portrayals of the American Presidency*
- *Brains! The Zombie Horde in Pop Culture*
- *Gilded Asheville: A Study of Asheville's Role in the Gilded Age*
- *Pirates! Studies in the Revolutionary Atlantic*
- *NCSSM Mini-Terms in*
  - *China*
  - *Costa Rica*
  - *Germany*
  - *Greece*
  - *Spain and Portugal*
  - *Senegal*
  - *The American West*

North Carolina School of Science and Mathematics

We channel Athena.

metis:

- To think critically and creatively
- To weave and carry out strategies
- To use language in powerful and persuasive ways

HELLAS Ο ΔΟΥΡΕΙΟΣ ΙΠΠΟΣ 1983

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ 4

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What to bring, how to pack

- Curiosity
- Openness
- Commitment
- Courage

North Carolina
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A spirit of collaboration and cooperation

North Carolina School of Science and Mathematics

You'll grow in . . .

- Skills and Knowledge
- Understanding
- Receptivity
- Confidence
- Resilience

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Learn to let
love
rather than
fear
be the
motivating
force.




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. . . and find joy in the journey.