AUBURN UNIVERSITY

K-12 OUTREACH
COLLEGE OF
SCIENCES AND
MATHEMATICS

COSAM Outreach
131 Sciences Center
Classrooms
Auburn University, AL

Program: Summer Science Institute 2023

Support: All expenses are covered for SSI students thanks to support from the College of Sciences and Mathematics Outreach Center, Society for Women in Sciences and Mathematics and the National Science Foundation.

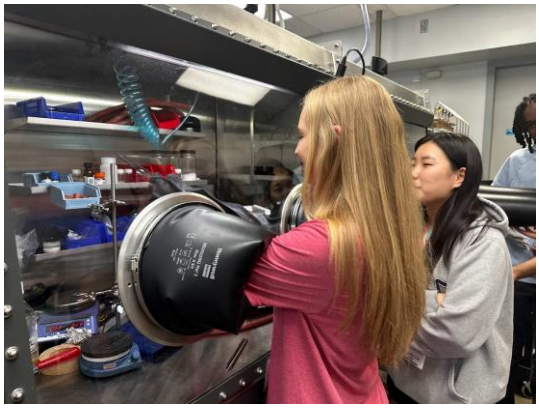
Dates: Sunday, June 4, 2023 – Saturday, June 10, 2023 (residential)

Description: This summer science program for outstanding 11th-12th grade students interested in science and mathematics is open to students residing in Alabama or Georgia. Seating was limited to 16 students and participation granted on an academically competitive basis. During the program students engaged with real-world applications and practitioners of science, performed experiments using cutting edge research equipment, and partnered with COSAM researchers to gain lab skills not taught in high school.

Personnel:

Counselors: Cara Brittain (PhD Candidate: Biological Sciences), Chase Ledbetter (PhD Candidate: Chemistry and Biochemistry), Kayci Messerly (PhD Student: Biological Sciences), and Emilee Middleton (Rising Senior: Chemical Engineering)

COSAM Faculty and Staff:

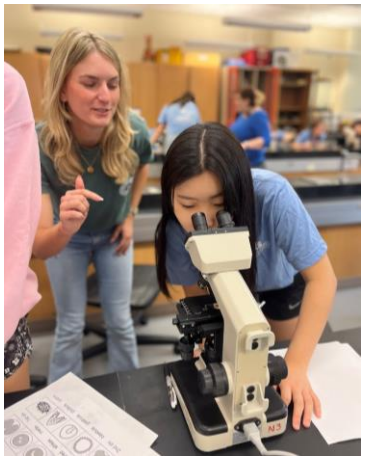


- **Faculty Coordinator:** Dr. Allen Landers (Physics)
- **Department of Biological Sciences:** Dr. Kate Buckley, Dr. Rita Graze, Dr. Aaron Rashotte, Dr. Tonia Schwartz, Shawn Jacobsen, Dr. Haruka Wada, Dr. Paul Cobine
- **Department of Chemistry and Biochemistry:** Dr. Paul Ohno, Dr. Chris Grieco, Dr. Evangelos Miliordos, Dr. Konrad Patkowski, Dr. Ethan Hill
- **Department of Physics:** Dr. Ryan Comes, Dr. Marcelo Kuroda, Dr. Melissa Halford, Dr. Stuart Loch, Dr. Uwe Konopka, Dr. Wencan Jin, Dr. Michael Gramlich
- **Department of Mathematics and Statistics:** Dr. Le Chen, Dr. Phuong Hoang, Dr. Junshan Lin
- **Department of Geosciences:** Dr. John Fronimos

Additional AU faculty/staff from COSAM Outreach Office: Mary Lou Ewald (Director), Dr. Jessica Gilpin (Assistant Director), Kristen Jackson (Program Coordinator)

Impact:

- **Total Number of Students:** 16 students (10 Female, 6 Male)
- **Age Range:** rising 11th-12th grades



Counties Impacted:

- **Alabama:** Elmore, Jefferson, Lee, Madison, Montgomery
- **Georgia:** Gwinnett

Auburn Facilities: Academic Classrooms and Laboratories Complex, Donald E. Davis Arboretum, Leach Science Center, Ralph Brown Draughon Library (Mell Building), Sciences Center Auditorium, Sciences Center Classrooms, Sciences Center Laboratories, Student Center

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The 2023 Summer Science Institute hosted 16 highly motivated, high achieving students who were chosen to participate by a competitive application process. The students were also selected based on interest in science, mathematics, and Auburn University. The average ACT score of the participants was **31.5** with a range of 28 to 35 (SAT average – 1430.0, range – 1340-1580). Prior to the first evening of the program, the students completed a short, informational pre-program Qualtrics survey. On the last day of the program, all 16 participants responded to a 24 question survey. The following section highlights some of the key results from the surveys.

Quantitative Survey Results:

- **100%** of students reported that SSI positively impacted their summer.
- **94%** of students reported they were very satisfied (50%) or somewhat satisfied (44%) with their overall experience at SSI.
- **94%** reported an increase (56% reported great increase; 38% reported an increase) in their understanding of how to engage in scientific research and **94%** feel confident in their ability to seek out and engage in undergraduate scientific research after participating in SSI.
- **75%** reported a greater interest in becoming a scientist after participating in SSI.
- After participating in SSI, **69%** reported an increased interest in biology, **63%** reported an increased interest in chemistry, **44%** reported an increased interest in physics, and **13%** reported an increased interest in mathematics.

- After participating in SSI, **88%** of students reported an increased awareness and knowledge of careers in biology, **100%** chemistry and physics, **38%** in geosciences, and **75%** in mathematics.
- After participating in SSI, **81%** of students reported an increased awareness of current research topics in biology, **93%** in chemistry, **12.5%** in geosciences, **88%** in physics and **75%** in mathematics.
- **100% of students found the courses academically challenging during the week.**
- The most enjoyable afternoon/evening program was the Chemistry Demo Night at the Arboretum with Chase Ledbetter and Dr. Hill with a rating of **4.67** out of **5**. The next most enjoyed activities were the Chemistry lab tour and the Herp Hunt, which both received scores of **4.2** out of **5.**

- Students reported the most enjoyable academic session was “Marine Animals” with Dr. Buckley, with an average rating of **4.75** out of **5**. The next most enjoyable sessions were the “Physics of Novel Phases” with Drs. Comes and Jin and “Changing Color with Electricity” with Dr. Greico, both with average ratings of **4.4** out of **5**.

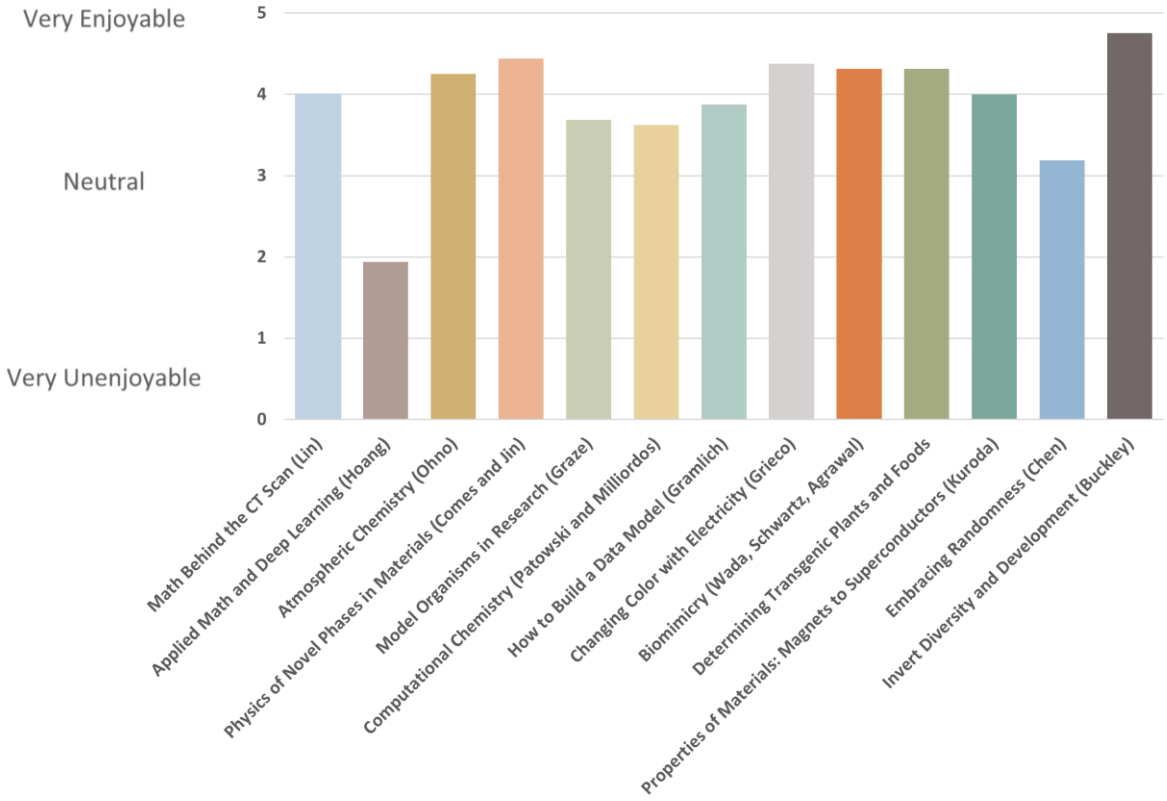

Figure 1. Distribution of how enjoyable the students felt each academic session was while participating in SSI.

- Students felt they acquired the most content knowledge in “Marine Animals” with Dr. Buckley and “Biomimicry” with Drs. Wada, Schwartz, and Agrawal, with an average rating of **4.1** out of **5**, followed by “CT Scan” with Dr. Lin **3.9** out of **5**.

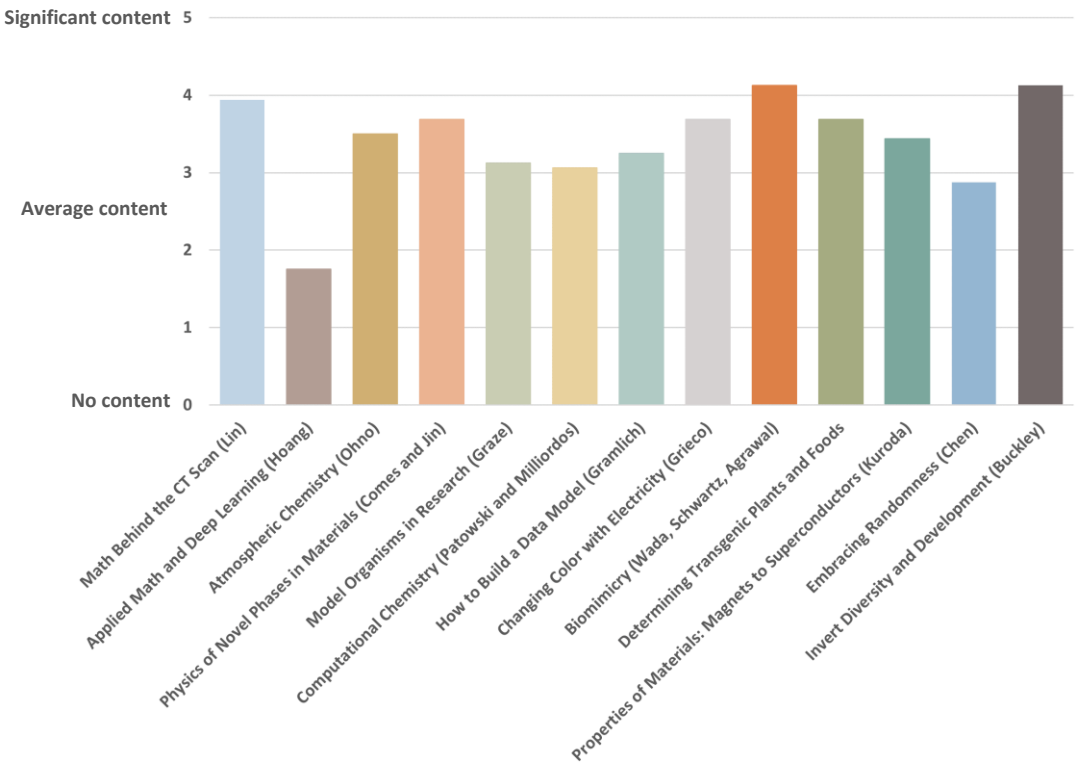

Figure 2. Distribution of content knowledge acquired during SSI academic modules

Schedule at a Glance:

	AU Summer Science Institute 2023 (June 4 - 10, 2022)						
	Sunday, June 4	**Monday, June 5**	**Tuesday, June 6**	**Wednesday, June 7**	**Thursday, June 8**	**Friday, June 9**	**Saturday, June 10**
7:30 - 8:15am		Breakfast					Pack Up Time
8:30 - 10:00am		**Compuatational Chemistry:** Patkowski & Miliordos	**The Physics of Novel Phases in Materials):** Comes & Jin	**The Mathematics behind the CT Scan:** Junshan Lin	**Determining if plants and foods are transgenic:** Aaron Rashotte and Lab	**Invertebrate Diveristy and Development:** Kate Buckley and Lab	Dorm Check Out with Parents
10:15 - 11:45				**How to Build a Model of Data**: Michael Gramlich	**The Role of Model Organisms in Scientific Research (Part 2):** Rita Graze	**Meet and Greet with Faculty Lunch and Final SSI Jeopardy**	Closing Ceremony Brunch
11:45-12:45		Lunch					Student departure
1:00 - 3:00pm		**Applied Mathematics and Deep Learning**: Phuong Hoang	**The Role of Model Organisms in Scientific Research (Part 1):** Rita Graze	**Changing Color with Electricity:** Christopher Grieco	**Properties of Materials from Magnets to Superconductors:** Marcelo Kuroda		
3:15 - 5:15pm	Student Check-In	**The Air We Breath: Atmospheric Chemistry and Air Quality Sensing:** Paul Ohno	**Campus Tour**	**Biomimicry:** Wada, Schwarts and Agrawal	**Embracing Randomness: The Intriguing Role of Chance in Science:** Le Chen		
5:30 - 6:30		Dinner	Dinner	Dinner	Dinner	Dinner Out Awards Ceremony at Burger Fi	
6:45 - 7:45pm	Welcome Dinner and Get to Know you Games	Down Time at Dorm	Down Time at Dorm	**Taco Night and Chemistry Demo Show at the Arboretum:** Ethan Hill	**Science Café:** John Fronimos		
7:45 - 10:00pm		**Herp Hunt in Tuskegee National Forest:** Shawn Jacobsen	Bowling at Good Times		Down Time and Packing	Auburn Summer Nights	
10:00 -10:45pm			Down Time	Down Time		Down Time	
11:00pm	Lights Out	Lights Out	Lights Out	Lights Out	Lights Out	Lights Out	

Summer Science Institute

Class of 2023

Participant Testimonials:

- “Overall, very fun and enjoyable experience.”
- “This camp was great, and I made so many new, great friends!”
- “I had a wonderful experience and am so glad I came, and I appreciated all the support, collaboration, and instruction this week!"