

Center for Children’s Health, the Environment, the Microbiome, and Metabolomics (C-CHEM²) Summer Undergraduate Research Fellows (SURF) in Data Science

Purpose: The purpose of this program is to expose students to the field of children’s environmental health research and to provide students a meaningful interdisciplinary research experience while working with center investigators to develop the analytic pipeline for center data in order to meet our aims.

Program Description: Students will engage in 10 weeks of research under the direction of Dr. Vicki Hertzberg. SURF students are expected to work full time (40 hrs/week) on a research project which will be determined during the first week of the program by the assigned mentor. Students will also be assigned an additional mentor (research staff, graduate student, or postdoc) who will meet at least weekly with the SURF student to support their efforts and provide guidance as needed. The student will work with their mentors to develop an analytic pipeline to address one or more specific research questions, using data gathered to date. A reproducible strategy that will produce dynamic documents is the goal. Students will spend a significant amount of time attending research meetings, programming, analyzing data, and preparing for a final presentation of their work and findings. Students will attend guest lectures participate in other Center activities such as Children’s Environmental Health Research Roundtables. Students will be provided a stipend of \$4,000 to cover living expenses.

Prerequisites: Applicants should be proficient in at least one programming language, preferably R or Python. The student will be expected to produce programs that provide a seamless interface with the data, process it so that it is in the appropriate format for analysis, explore it, clean it, and apply the appropriate analytic and visualization tools. The student will use the RStudio Integrated Development Environment, Rmarkdown, knitr, maintaining dynamic script files so that their work can be done reproducibly (an alternative reproducible workflow in Python is also acceptable).

Center Information:

Principal Investigators

Linda A. McCauley, R.N., Ph.D.

P. Barry Ryan, Ph.D.

Researchers at the Center for Children’s Health, the Environment, the Microbiome, and Metabolomics (C-CHEM²) conduct research to understand the complex interactions among components of the prenatal and postnatal environment — toxicant exposures, the microbiome, and the metabolome — and their impacts on birth outcomes and infant health and neurodevelopment. The human microbiome is representative of microbial organisms that reside in the gut, while the metabolome represents the collection of metabolites and small molecules found in the bodily tissues, organs, and cells.

Environmental exposures among residents of the urban Southeast are likely distinctive from people in other parts of the United States; however, no studies have characterized exposures among minorities within this region from birth. C-CHEM² leverages data and samples from a newly funded cohort of more than 800 African American women and their children living in metropolitan Atlanta to investigate how behavioral factors and the microbiome impact preterm birth and how epigenetics and genetics affect the microbiomes of study participants. The center also leverages rich datasets and resources within the NIEHS-funded Human Exposome Research Center: Understanding Lifetime Exposures (HERCULES) at Emory, and an interdisciplinary team of scientists with expertise in environmental health, neurodevelopment, maternal-child health, and preventive medicine.

Project 1: Characterizing exposures and outcomes in an urban birth cohort (CHERUB)

Project leaders: Dana B. Barr, Ph.D., and Anne Dunlop, M.D., M.P.H.

In this project, researchers are following an urban birth cohort of African American mother-infant pairs to study pre- and postnatal environmental exposures and the independent and interactive effects of these exposures on the maternal microbiome and health outcomes, such as preterm birth.

Project 2: Microbiome, environment, and neurodevelopmental delay (MEND)

Project leaders: Patricia A. Brennan, Ph.D. and Jeannie Rodriguez, Ph.D.

Researchers in this project are following an urban birth cohort of African American mother-infant pairs to determine how prenatal and postnatal environmental exposures influence the infant gut microbiome as well as neurodevelopment and behavior during the first 18 months of life.

Project 3: Metabolic, microbiome, and toxicant-associated interactions (MATRIX)

Project leaders: Elizabeth J. Corwin, Ph.D. RN, FAAN, Dean P. Jones, Ph.D.

Researchers are employing high-resolution metabolomics analysis techniques to characterize metabolites and metabolic pathways in biological samples collected from an urban birth cohort of African American mother-infant pairs. Researchers will investigate associations between specific metabolites and metabolic pathways and pre- and postnatal environmental exposures, the maternal and infant microbiome, and infant birth and neurodevelopmental outcomes during the first 18 months of life.

Community Outreach and Translation Core (COTC)

Core lead: Linda A. McCauley, R.N., Ph.D.

The C-CHEM² COTC is building upon strong, preexisting partnerships within the Atlanta environmental health community to share research findings with local communities in a format that is relevant, accessible, and culturally-appropriate. The COTC is guiding scientists in community outreach and translation and expanding bi-directional dialogue with metropolitan African American women of childbearing age and their families. The core is also developing innovative strategies to translate research findings into practical information that African American families can use to protect their children's health and is integrating this knowledge into educational programs for health-care professionals.

Learn more about the Center at:

<https://www.niehs.nih.gov/research/supported/centers/prevention/>

<http://www.nursing.emory.edu/c-chem2/index.html>

Application Instructions:

Electronic application packets are due April 1st 2017. Awards will be announced late April 2017.

Application Packet Instructions:

- All items are to be scanned and emailed to Nathan Mutic at nathan.mutic@emory.edu
- Email all questions to Nathan Mutic, please do not email center investigators with questions about the center or SURF program directly.
- List "C-CHEMM-SURF-Last Name" in the subject line of your email.
- Incomplete applications will not be reviewed
- Include the following items:
 - Completed C-CHEM²-SURF application
 - One letter of recommendation from a recent professor or supervisor
 - Sealed letters can be mailed to the following address if not available to scan:
Nathan Mutic, Rm 411
Emory University School of Nursing
1520 Clifton Rd NE
Atlanta, GA 30322
 - College transcript (copies of official transcripts are acceptable)
 - Resume (two page maximum)

Eligibility:

- Undergraduate student in good standing at Emory University or Georgia Institute of Technology.
- Ability to commit to 10 week summer program at 40 hours per week, preferably starting on May 9th 2017 Any known conflicts must be clearly outlined in the application. The start and end dates may be modified at the center investigators discretion to accommodate for pre-existing or unforeseen scheduling conflicts.

In the space provided, describe how your involvement in this program will support your long-term academic and career goals:

If selected for the C-CHEM²-SURF program I will commit to participating in 10 weeks of full time (40 hours per week) research during the 2017 summer semester. I hereby give permission to the C-CHEM²-SURF selection committee to review my transcripts and application materials.

Student Signature: _____ Date: _____