# Pediatrics Boilerplate Document

### Emory University

Founded in 1836, Emory University is a national center for teaching, research, and service, awarding more than 5,050 undergraduate and graduate degrees in 2020-2021. It is recognized by *U.S. News & World Report* as one of the top 25 universities in the US (ranked 21st in the 2022 report).

In 1966 the University’s Board of Trustees integrated all of Emory’s health components into the Robert W. Woodruff Health Sciences Center. The Woodruff Health Sciences Center joins those components of Emory University concerned with patient care, education of health professionals, research affecting health and illness, and policies for prevention and treatment of disease. Its components include schools of medicine, nursing, and public health; Emory National Primate Research Center; Winship Cancer Institute; Emory Global Health Institute, and Emory Healthcare, the most comprehensive health system in Georgia.  https://boilerplate.emory.edu/pages/the-robert-w-woodruff-health-sciences-center

**Funded Research at Emory**

Researchers at Emory University received $944.5 million from external funding agencies in fiscal year 2022, breaking the previous record-shattering year of research funding. This extraordinary achievement breaks the institution’s previous record of $894.7 million last fiscal year and represents its first year exceeding $900 million.

In FY 2021, federal agencies awarded $598 million, or more than 66 percent of the University's total, led by the National Institutes of Health, with $526 million in awards. NIH funding represented nearly 58 percent of total federal dollars awarded to Emory.  Contracts and awards from industry sponsors accounted for $78 million, while funding from the state of Georgia totaled $14 million. Contributions from private and non-profit organizations jumped the most year over year, climbing 48 percent to $131 million.

### The Robert W. Woodruff Health Sciences Center

Founded in 1966, the Woodruff Health Sciences Center is named for the legendary leader of the Coca-Cola Company, Robert W. Woodruff.

**The Robert W. Woodruff Health Sciences Center (WHSC)** is an academic health science and service center focused on missions of teaching, research, health care and public service. It is composed of the Emory University School of Medicine, Rollins School of Public Health, Nell Hodgson Woodruff School of Nursing, Emory National Primate Research Center, and Emory Healthcare, the most comprehensive health system in Georgia, which comprises those components dedicated to patient care. Major teaching affiliates of the Emory University School of Medicine include Grady Memorial Hospital and its community clinics, the Atlanta Veterans Affairs Medical Center, and Children’s Healthcare of Atlanta (Children’s). The institutions of the WHSC have long been recognized for the quality of their programs in patient care and research with $5.5 billion in operating expenditures, 33,456 employees including 3,673 faculty, 5,848 students and trainees, and a $9.24 billion economic impact on metro Atlanta. In fiscal year 2022, Emory received over $944 million in total research funding, WHSC received $899.5 million —or 95 per cent—of the university’s total research funding. Emory Healthcare has 2,691 hospital beds, 106,623 annual hos­pital admissions, and 5.4 million annual outpatient/other patient services. Physicians in Emory Healthcare and affiliate hospitals are responsible for 7.8 million patient services a year. Emory currently has 26,289 participants enrolled in 2,181 clinical trials of investigational drugs, devices, and procedures, more than any other institution in the state of Georgia. In summary, the WHSC creates an exceptionally rich environment for clinical research.

### LISTS, FACTS & STATS

#### Woodruff Health Sciences Center Components

• Emory University School of Medicine

• Nell Hodgson Woodruff School of Nursing

• Rollins School of Public Health

• Emory National Primate Research Center

• Winship Cancer Institute

• Emory Global Health Institute

• Emory Healthcare (EHC)

• Emory University Hospital

• Emory University Hospital Midtown

• Emory University Orthopaedics & Spine Hospital

• Emory Rehabilitation Hospital

• Emory University Hospital at Wesley Woods

• Emory Saint Joseph’s Hospital

• Emory Johns Creek Hospital

• Emory Decatur Hospital

• Emory Hillandale Hospital

• Emory Long-Term Acute Care

• Emory University Hospital Smyrna

• Emory Clinic (physician practice of Emory faculty physicians)

• Emory Specialty Associates (Emory-owned outreach physician practice organization with locations throughout the city and state)

• Emory Wesley Woods Campus (includes psychiatric hospital as well as a skilled nursing care facility and an affiliated residential retirement facility)

• Emory Healthcare Network (clinically integrated network of Emory faculty and private practice physicians and hospitals formed to improve care coordination and quality outcomes)

The Woodruff Health Sciences Center is part of Emory University, which also includes Emory College of Arts and Sciences, Oxford College, Laney Graduate School, Goizueta Business School, Emory School of Law, and Candler School of Theology. Including the health sciences, Emory has a total of 15,398 students, 5,258 faculty, 39,736 employees, and $8.6 billion in endowment.

#### Comprehensive Figures in Woodruff Health Sciences Center (WHSC)

* Faculty: 3,673
* Adjunct faculty: 1,505
* Students and trainees: 5,848
  + Medical: 582
  + Medical residents and fellows: 1,322
  + Nursing: 998
  + Public health: 1,382
  + Postdocs: 495
  + Allied health: 522
  + Graduate Division of Biological and Biomedical Sciences: 414
  + MD/PhD: 92
  + Master’s in Clinical Research: 41
* Employees (includes 3,673 faculty): 33,456
* Hospital beds: 2,691
* Annual Emory Healthcare hospital admissions: 106,623
* Annual Emory Healthcare outpatient service visits: 5.4 million
* Annual Emory Healthcare nursing home admissions: 898
* Number of unique patients treated annually in Emory Healthcare: 819,168
* Annual inpatient and outpatient service visits (Emory Healthcare and affiliate hospitals): 7.8 million
* Research funding (FY 2019): $641.9 million
* Annual operating expenditures (FY 2019): $5.5 billion
* Annual budget (FY 2020): $5.8 billion
* Annual economic impact on metro Atlanta: $9.24 billion
* Emory Healthcare charity care (FY 2019): $151.5 million
* WHSC annual community benefit: $688 million
* Endowment: $3.4 billion
* Total buildings: >100
* Total net square feet: 5.2 million

### Rankings

### The publication ranked university programs from 90 countries worldwide on 13 indicators measuring academic research performance and global reputation. Six programs within the Woodruff Health Sciences Center (WHSC) were ranked within the top 25 worldwide. Among those programs earning high marks for excellence include Infectious Diseases (#15), Public, Environmental, and Occupational Health (#15), Clinical Medicine (#21), Surgery (#23), Immunology (#23) and Cardiac and Cardiovascular System (#24).

### EMORY UNIVERSITY SCHOOL OF MEDICINE

Founded in 1854, Emory University School of Medicine is ranked among the nation’s finest institutions for education, biomedical research, and patient care. Emory University School of Medicine has 3,301 full- and part-time faculty and 849 volunteer faculty.

The school had more than 11,681 applications in 2020 for 138 first-year medical student positions. This class is composed of 77% women and 25% under-represented minorities, and 83% of the class members are nontraditional (they were out of college for at least a year before entering medical school). In 2019, the pass rate for first-time takers of step 1 of the National Board Exam (testing basic science knowledge and skills) was 98%. The school has 565 medical students and trains 1,349 residents and fellows in 111 accredited programs. The school has 94 MD/PhD students in one of 48 NIH-sponsored Medical Scientist Training Programs. Some of these students are in a joint program with Georgia Tech, with which the medical school shares a biomedical engineering department ranked second in the country by *U.S. News & World Report.* The medical school also offers a joint MD/MSCR (master’s in clinical research) degree, an MD/MPH degree with public health, and an MD/ MA in bioethics with Laney Graduate School. Dual programs with law (juris master) and business (MBA) also are available. Some 301 medical faculty also train predoctoral bioscience researchers in eight programs in the Graduate Division of Biological and Biomedical Sciences in the graduate school. Faculty in five allied health programs train 495 students. These include physician assistant (PA) and physical therapy (PT) programs, each ranked fifth in the nation by *U.S. News & World Report.*

Medical school faculty received $565.6 million in sponsored research funding in fiscal year 2020. Ranked 17th nationally in NIH dollars received, the school is best known for its work in infectious disease, brain health, heart disease, cancer, transplantation, orthopaedics, pediatrics, renal disease, ophthalmology, and geriatrics.

Physician faculty in Emory’s own and affiliate teaching hospitals and outpatient venues were responsible for 6.1 million patient service visits in 2020. Alumni totals: 6,196 medical school, 12,080 residency/fellowship, 6,794 allied health, including 1,538 PT and 1,981 PA alumni. In addition, 7,718 physicians and other health care professionals participated in continuing medical education classes offered by Emory last year.

At a glance:

* The school has 3,301 full- and part-time faculty and 849 volunteer faculty.
* The school had more than 11,681 applications in 2020 for 138 first-year medical student positions. This class is composed of 77% women and 25% underrepresented minorities, and 83% of the class members were out of college for at least a year before entering medical school.
* In 2020, the pass rate for first-time takers of step 1 of the National Board Exam was 98%.
* The school has 565 medical students and trains 1,349 residents and fellows in 111 accredited programs. The school has 94 MD/PhD students in an NIH-sponsored Medical Scientist Training Program, the only one in Georgia and one of 51 in the country.
* The medical school shares a biomedical engineering department with Georgia Tech that is ranked second in the country by U.S. News & World Report.
* The medical school offers a joint MD/MSCR (master’s in clinical research) degree, an MD/MPH degree with public health, and an MD/ MA in bioethics with Laney Graduate School. Dual programs with law (juris master) and business (MBA) also are available.
* Some 301 medical faculty also train predoctoral bioscience researchers in eight programs in the Graduate Division of Biological and Biomedical Sciences.
* Faculty in five allied health programs train 495 students. These include physician assistant (PA) and physical therapy (PT) programs, each ranked fifth in the nation by U.S. News & World Report.
* Medical school faculty received $373.8 million in sponsored research funding in fiscal year 2023.
* Ranked 17th nationally in NIH dollars received, the school is best known for its work in infectious disease, brain health, heart disease, cancer, transplantation, orthopaedics, pediatrics, renal disease, ophthalmology, and geriatrics.
* Physician faculty in Emory’s own and affiliate teaching hospitals and outpatient venues were responsible for 6.1 million patient service visits in 2020.
* Alumni totals: 6,196 medical school, 12,080 residency/fellowship, 6,794 allied health, including 1,538 PT and 1,981 PA alumni.
* 7,718 physicians and other health care professionals participated in continuing medical education classes offered by Emory last year.

### Department of Pediatrics

### The Emory Department of Pediatrics currently includes 231 faculty conducting research, 183 of whom are extramurally funded with over 548 extramurally funded research projects (grants and contracts). Growth in extramural research funding for the department has been on a considerable trajectory. In 2005, the Department of Pediatrics had just 193 total faculty members and reported approximately $10 million in extramural funding. By the end of fiscal year 2020, the faculty members in the DOP topped out at 498 and research funding levels were at $111.8 million in total funding and $80 million in NIH funding, which allowed them to achieve a #1 ranking for NIH funding in Departments of Pediatrics in both 2020, a ranking that was repeated in 2022. During Emory’s 2023 fiscal year, the pediatrics department received $164 million in total extramural funding, the highest amount in its history, exceeding 15% of all research funding for the university, ranking once again in the top five (achieving 8 consecutive years of this top ranking). Additionally, thirty researchers received $1 million or more in extramural funding. Of note, research grants in the Emory Department of Pediatrics are only a part of the overall research enterprise in child health at Emory. All child health related research funding at Emory University in FY22 was over $194M, which comprises about 21% of the entire Emory University funding portfolio.

### In addition to $47 million in NIH grant funding that led to the No. 5 ranking, more than 1,800 publications in more than 800 journals in the same time period helped support groundbreaking efforts to develop new treatments or cures in 50 specialty areas. Rankings are calculated by the Blue Ridge Institute for Medical Research and only take into account direct NIH grants, which help develop research for the public good and were awarded to between October 1, 2022 and September 30, 2023. The rankings do not include NIH contracts, which are a means of procuring service for the government, such as the over $68 million in contracts awarded to researchers in the DOP during this fiscal year.Rollins School of Public Health - Resources

Laboratory:  
RSPH has occupied a new laboratory building effectively quintupling useful research facilities. There are three floors of laboratory space totaling approximately 20000 ft2.The laboratories are not dedicated to specific departments but rather researchers with common research interests and potential to share equipment and supplies are grouped into clusters. Laboratory benches have been assigned to investigators using a model of shared research space. The open design allows for easy expansion and contraction of assigned bench space as projects come online or are completed. Space includes thirty-six laboratory benches, several large fume hoods, instrumentation rooms, tissue culture rooms, and adequate water, gas, electrical, and other services to ensure proper laboratory practice. The laboratory has 6 new mass spectrometers (GC-MS/MS and GC-MS ; HPLC-­MS/MS and HPLC-MS, FTMS and ICP-MS) that enable the analysis of the entire gamut of environmental toxicants, hormones, and other organic and inorganic compounds ranging from metals to proteins. Specifically, this equipment will include an Agilent 6460 Series triple quadrupole HPLC tandem mass spectrometer with an APCI/ESI interface for the analysis of polar chemicals in biological and environmental samples, an Agilent 7000 GC tandem mass spectrometer with EI and CI interfaces allowing the analysis of volatile and semi-volatile chemicals in multiple matrices, an Agilent 7700 ICP-MS with a micronebulizer equipped with an HPLC to facilitate the analysis of metals and speciated metals in multiple matrices, an Agilent GC/MS 5975C inert XL EI/CI MSD/DS Turbo CI System with autosampler and thermostatted column, an Agilent LCMS Single Quad AJS Superior Line Bundle Which includes G6150B quadrupole, Agilent Jet Stream, autosampler,and thermostatted column.Dionex Accelerated Solvent Extraction System, a Thermo Finnigan LTQ-FTMS which allows for high resolution analysis, metabolite identification, and metabolomics and a Shimadzu UV-2600 UV/VIS Spectrophotometer equipped with an autosampler and microsipper kit. All instrumentation will be networked to the Rollins School of Public Health and Emory University network systems affording rapid and secure data transfer to locations within the Emory system.Other existing equipment available include glassware, reagent storage areas, PCR equipment (including three PCR thermocyclers, general preparatory equipment, a FastPrep for preparation of samples for detection of protozoans, and two shared RT-PCR units; electrophoresis systems; water quality analysis equipment (including several membrane filtration set-ups and an IDEXX Quantitray sealer); There are several portable units for carrying out field measurements of physiochemical water quality parameters (colorimeter, turbidimeter, pH meter) as well as portable membrane filtration units for use in remote locations and networked laboratory computer facilities using networked Dell computers operating speeds of at least 1.5 GHz and equipped with at least 100 GB mass storage devices.Further, the RSPH maintains a Hewlett-Packard 5890 Gas Chromatograph equipped with both a flame ionization detector, and electron capture detector; a Perkin-Elmer 4100ZL Zeeman-corrected atomic absorption spectrophotometer with graphite furnace and hollow cathode lamps specific for various metals; a Shimadzu High Performance Liquid Chromatograph, Model LC-10AT capable of four-mobile phase gradient elution, equipped with a SPD-10A UV/VIS detector, a RF-10A Spectrofluorometric Detector, an SIL-10 Auto Injector, and an SIL-10A System Controller; a Microbalance, as well as other balances. Included within the general laboratory facilities is a Milli-Q 18 MΩ ion-free water supply system, cold-storage room (-10oC), isotope counting rooms, biological safety cabinets, clean-room technology and numerous -80 and -20oC freezers with available space for long-term storage of samples.

Animal:    
Emory University has centralized administration and management of its animal resources through the Division of Animal Resources, which provides programs, facilities, personnel and equipment for animal care. The animal husbandry program includes the provision of proper housing, sanitation, and nourishment. The animal health program is under the direction of five full-time veterinarians who provide veterinary care to all Case-owned laboratory animals. Veterinary medical care consists of quarantine and isolation, preventive medicine programs, anesthesiology and surgical support, daily observation, treatment or intervention for injury and illness, humane euthanasia, and diagnostic laboratory services. Animals are observed and provided care and veterinary services are available during normal working hours and on weekends and holidays. Emergency care is available during all non-business hours.

Cores:  
Biostatistics/Bioinformatics Core: The primary objective of the Biostatistics Core is to strengthen the statistical rigor of research and investigators’ capacity to mine biodata from multiple sources. The specific functions of the core are to: 1) Support and Guidance for Design Issues 2) Provide guidance and support to all Projects for epidemiological modeling, including development of methodologies for identifying and characterizing mixtures and their health effects 3) Methodological Development 4) Evaluate and Correct for Measurement Error 5) Archive, Document and Assure Security of Analytic Data Files. The Biostatistics Core is based in the Rollins School of Public Health at Emory University. The Information Technology (IT) Department of the Rollins School of Public Health maintains a Linux cluster computing environment that supports the latest scientific tools for performing data analysis and statistical modeling. It is expandable and offers both a stable platform for high performance computing as well as a development platform from which to migrate to the larger cluster environment maintained at the University level. The cluster consists of a head node with 8 cpus at 3 Ghz with 32 GB RAM, and 6 compute nodes with 4 – 16 CPUs and 16 – 96 GB RAM at each node. The head node provides access to a development environment for user applications. The compute nodes exclusively run user programs in a batch environment for maximum throughput. The cluster environment stores its data on a HIPAA compliant Storage Area Network (SAN). All cluster nodes connect to the SAN via a dedicated 2GB Fibre Channel private connection. There is 2TB of shared disk space attached to the cluster. Storage space exclusive to specific research projects can be purchased and added to the cluster.

Computer:  (see below for expanded computer/technology resources)  
Resources necessary to complete the tasks shown above include telecommunications equipment, computer facilities, Internet access, and laboratory equipment and space. Emory University maintains a large telephone network complete with all modern facilities including voice/data transmission, voice mail, teleconferencing, and video transmission.  RSPH maintains extensive computing resources for computing, data management, back-up, and software delivery. Computing services are provided by a Sun SunFire V1280, with 12 1.2GHz UltraSparc IIIci processors and 24G RAM. Storage is provided through a storage area network (SAN) over a fibre channel network, with 1 terabyte of RAID-protected storage dedicated to the compute server. The server hosts analysis and programming tools including: SAS, SPlus, Fortran 77/90, C, C++, Gauss, Java, R, and IMSL. Services are provided to the desktop using the X Windows interface. The Emory/RSPH mail server, which also provides primary DNS services, is a Sun SunFire V880 with 4 900MHz UltraSparc III CPUs with 8G RAM and 1.4 terabytes of protected storage (some mirrored internal fibre channel drives, and some on external RAID arrays connected via fibre channel). The primary web server is an identical machine with 146G of mirrored fibre channel storage. The main database server is a Dell PowerEdge 2650 with dual Pentium 4 Xeon processors and 8G RAM, running Windows 2003 and MS-SQL Server. The SAN provides access to 265G of RAID-protected storage. Web access to this database is provided by Macromedia's ColdFusion application server, which runs on a Dell PowerEdge 2650 (dual P4 Xeon, 4G RAM) running RedHat Enterprise Linux. Based on Windows NT, seven servers work together to provide file and print service to the school's desktop network. These state-of-the-art systems provide general use programs, including statistical and mathematical modeling software, database management, graphics and office support tools. The Emory/RSPH network consists of Fast Ethernet hardware running TCP/IP. Gigabit Ethernet provides high speed (10 Mbps) access to most desktop computers and peripheral devices. At least two Dell Optiplex desktop computers with Pentium IV configuration and 512 megabytes RAM memory will be made available for this project. The research group has excellent computer facilities which afford easy access to data on network as well as adequate computing power for data analysis.  Available workstations are all IBM-PC or Apple Mac compatible computers, generally with Core 2 processors and at least 2 GB of main memory, and hard drives in excess of 100 GB.  Rollins School of Public Health maintains a school-wide network affording easy exchange of data among all computer systems.  A “Common Drive” system of servers is available that allows controlled access of all data files from both inside the School using a Microsoft NT based network system and from outside the School using Microsoft Virtual Private Network.  The facilities are maintained by a staff dedicated to this endeavor and funded out if University and indirect source.  All common software packages, including those for statistical analysis and modeling are available on the network or for a nominal medium charge from the Information Technologies Division of Emory University.

Office:    
The Emory/RSPH telephone network includes voice/data transmission, voice mail, facsimile, teleconferencing, and video transmission. Hewlett Packard ScanJet digital scanners and Cannon ImageRunner photocopiers are also available.

Major Equipment at RSPH:

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| --- | --- |
| **Equipment** | **Capabilities** |
| ThermoFinnigan LTQ-MS high Resolution mass spectrometer with LC interface | Quantification of analytes, metabolomics (exposomics), identification of unknown chemicals |
| Agilent 6460 Triple quadrapole mass spectrometer with an HPLC and APCI and ESI interfaces | Analysis of polar organic chemicals in biological and  environmental matrices |
| Agilent 7000 Triple quadrupole mass Spectrometer with a GC and EI or CI capabilities | Analysis of volatile and semi-volatile organic chemicals in biological and environmental matrices |
| Agilent 7700xx  ICP-MS with an HPLC interface | Analysis of total metal and speciated metal concentrations in biological and environmental samples |
| Gas chromatograph Hewlett Packard 5890 Series II equipped with ECD and FPD | Analysis of organochlorine pesticides in biological and environmental samples |
| Gas chromatograph Agilent Techonlogies 7890A equipped with 5975C inert XL EI/CI MSD | Analysis of pesticides and their metabolites in biological and environmental samples |
| HPLC Shimadzu | Analysis of pesticide metabolites in laboratory test samples |
| Atomic absorption spectrophotometer, Graphite furnace, Perkin Elmer 4100 | Analysis of metals biological and environmental samples |
| Agilent G33174A mass spectrometer with a 7890A gas chromatograph with dual EI/CI Ionization | Analysis of non-polar organic chemicals in multiple matrices |
| Agilent G6150B quadrupole mass spectrometer with an Agilent 1200 HPLC and a jetstream ESI and APCI interface with an N2 generator | Analysis of polar organic chemicals in multiple matrices |
| Accelerated solvent extraction system | Extraction of a wide array of chemicals from solid matrices |
| Automated 96-well plate UV-Vis/Fluorescence immunoassay plate readers | Hormone and other immunoassays |

**Expanded Computer/Technological Resources**  
RSPH has a state-of-the-art desktop and server infrastructure that supports over 2500 users. From the ground up, it was designed to be modular and expandable so as to give the School the greatest computing capability, flexibility, and growth potential. The RSPH network consists of Fast Ethernet hardware running TCP/IP. Gigabit Ethernet provides high speed transmission to each of 10 floors and across three buildings. Ethernet provides high speed (100 Mbps) access to most desktop computers and peripheral devices. The network terminates at over 900 locations. Each contains three connections (2 UTP and 1 Fiber). More than 45 miles of UTP CAT 5 2061 cable and more than 18 miles of fiberoptic cable provide the capability of high-speed voice, video, or data to every desktop. The RSPH network is connected to the Emory Campus backbone via a 100 Mbps Ethernet connection, making campus services and wide area network services readily available.

*Desktop Computers:* Currently, new computers are at least a Core 2 Duo configuration with 2GB of RAM memory and have CD/DVD-RW and flat panel monitors standard.

***Server Environment***  
The school’s server environment is based on a combination of UNIX and Windows and can be divided into a number of service areas:

Computer Services: The core of the compute services is provided by a high-performance computing cluster composed of 18 nodes with an aggregate of 354 processors and 3 TB of RAM. Storage is provided through our storage area network (SAN) and the central Isilon storage with 200 terabytes of RAID-protected HIPAA-compliant storage local on the cluster. The server hosts analysis and programming tools including: SAS, SPlus, gFortran, C, C++, Java, R, and MATLAB. The application environments are 64 bit and parallel computing enabled when the product supports the capability. Services are provided to the desktop using the X Windows and Univa Grid Engine interfaces.

Internet/Web Services: The email services are provided by a central campus resource through Office 365, and we have access through a browser or direct interface such as Outlook. Secure and open access web services are provided. The secure web areas can be restricted to the Emory network or an account. There are a number of services that support various CMS, JAVA environments, and other web services. The school takes advantage of a central IT CMS service called Cascade for our main school website. All Rollins web content is served up through our local web servers, which also support center, program, and personal faculty research websites. A number of application environments to support research endeavors such as a Cold Fusion development server, RedCap, and Feedback server survey tools are available.

Database Services: Both secure and academic database services utilizing Microsoft SQL Server 2008 and MySQL instance are available. These databases are used to service a number of application systems across administrative and research needs. Database accounts are available for any faculty member upon request.

File and Print Services: Based on Windows NT, seven servers work together to provide file and print service to the School's desktop network. These state-of-the-art systems provide the latest in general use programs, including statistical and mathematical modeling software, database management, graphics and office support tools.

***Network Environment***  
Rollins’ network consists of Fast Ethernet hardware running TCP/IP. Ten Gigabit Ethernet provides high-speed transmission to the Rollins campus buildings and all other buildings across campus. Ethernet provides high-speed (100 Mbps) access to most desktop computers and peripheral devices. The network terminates at over 2,500 locations.

The Rollins network is connected to the Emory Campus backbone via a 10 Gigabit Ethernet connection, making campus services and wide area network services readily available. Rollins has an extensive wireless network providing “N” class connections and speeds that cover all of buildings and the nearby external areas. This network has guest services as well as secure services for faculty and staff.

Voice communications are connected into a Unified Communications system that provides phones through VOIP and are integrated with our email systems for VMail access. All the secured services inside our firewalls including network storage and other services can be access through the Emory VPN.

***Information Security***  
The Rollins School of Public Health information technology environment is a HIPAA-covered entity and complies with HIPAA and Emory information security and privacy policies and practices. In compliance with these policies and practices, Rollins aligns with the National Institute of Standards and Technology (NIST) special publications (800 series) for identifying, assessing, and managing information security risk within a technology environment.

Drawing on federal and industry best practices, Rollins has implemented a series of multi-layered security controls to protect the integrity, reliability, and confidentiality of data. A sample of the key security controls includes:

* An annual risk assessment of all Rollins information technology assets with their level of risk, potential impact, probability, and controls evaluated based on NIST SP 800-30 Risk Management Guide for Information Technology Systems.
* Rollins and Emory networks are protected by firewalls and intrusion detection devices. Rules on these devices are set to deny all traffic by default and "allows" are written as exceptions. These devices are updated as appropriate through Emory University's change management process and evaluated to ensure they provide the appropriate level of protection based on the sensitivity level of the data.
* Servers are housed within a secured network operating center (NOC). The NOC has environmental controls (fire, water, temperature), is accessible only through a two-factor authorization system (key card and passcode), and is accessible only by authorized information technology personnel. In the event of a power outage, the NOC devices will draw UPS power from a backup generator.
* All servers are configured based on Rollins and Emory University best practices. Only authorized, trained system administrators have administrative privileges on the servers. System administrators monitor security mailing lists and sites and patch/update systems based on priority of the patch. All servers are periodically scanned for vulnerabilities and any identified vulnerabilities are assessed and managed.
* All information technology personnel go through background checks before gaining access to administrative privileges. At the point of termination with Emory, all information technology personnel's administrative privileges are removed.
* Protected health information (PHI) data and the services that manage them are stored on a separate network and server infrastructure with limited access and additional security controls.
* Data is backed up daily. Backups are stored in a tiered structure for disaster recovery purposes and include local, off-site, and out-of-state storage. Data stored off-site is encrypted to prevent compromise and can only be retrieved by authorized personnel.
* Data written to any Rollins file servers is checked with server-based anti-virus software. Access to data is verified with a local single point of contact within each department before any access control is granted. Principal investigators are required to review access control lists each year to ensure continued accuracy.
* All Rollins desktops are configured based on best practices in the industry as well as those outlined in NIST SP 800-69 Guidance for Securing Microsoft Windows XP Systems for IT Professionals: A NIST Security Configuration Checklist. All Windows machines have anti-virus software installed with updated virus signatures as well as the latest Microsoft XP Professional updates. Desktops require authentication from the Emory Active Directory to gain access to network services.
* Security policies are created and reviewed through the Woodruff Health Sciences Center HIPAA committee, the Emory University Technology Infrastructure and Policy committee, and local policies through the Rollins Information Technology Advisory committee.

***Conference rooms***  
The RSPH Claudia Nance Rollins Building and Grace Crum Rollins Building have conference rooms that allow for the easy hookup of laptops and other computers to be displayed on a large LCD or a projected screen, which can be used by the study team on an as-needed basis. Each conference room has access to the CATV systems as well. Audio conferencing is built into the room where no external sound units are required to hold a conference call. Each conference room has connectivity abilities for high-end video conferencing systems that are wheeled in on a cart. The cart provides a Picture Tel system that can share up to four sessions and all of the content and sound connected in the room. The audio and video integrated in the room are also available for any PC hooked up to the systems so audio can be captured in the room and then used for PC-based video conferencing systems such as Skype.

***Data protection and backup***  
Full back ups of the HPC and servers are conducted once a week with incremental back-ups on other nights. These back-ups are kept for 90 days and are encrypted at an off-site location. Network shares have snapshots taken nightly, which are kept for 30 days.

***Email/Vmail***  
We use a central IT services resource using Microsoft Office365 for our email. Our email is considered sensitive, so we have policies in place that control automated routing of email and we use a central spam engine to control propagation of virus and spam attacks. Our phone voice mail system is integrated with our email, so voice mails automatically produce email audio files upon receipt.

**Office**  
Secretarial and computer support (including fax, e-mail, Internet, color printing, scanning and photocopying) are available to all Public Health faculty.

**Other**  
Six campus libraries are available for use, including the Woodruff Library for Advanced Studies, and the Health Sciences Center Library. The university library system has access to thousands of journals and periodicals as well as, reference services which include computerized database searching. Computer laboratory and audiovisual facilities are also available within the university system. The CDC library is also available for use.

### Nell Hodgson Woodruff School of Nursing

As one of the nation’s top nursing school in the U.S News rankings and research, Emory University’s Nell Hodgson Woodruff School of Nursing has committed to educating visionary nurse leaders and scholars for more than 100 years. Located in Atlanta, GA, Emory Nursing produces nursing leaders who are transforming health care through science, education, practice, and policy worldwide. Established in 1905, the vision is to promote optimal health and wellness for all by creating, changing, and leading through innovative teaching, discovery, nursing practice, and social action in our local and global communities.

Nell Hodgson Woodruff School of Nursing has 638 baccalaureate, more than 351 masters, and 30 PhD, and 119 DNP students as well as 11 postdoctoral fellows. The school’s educational and research programs bring together cutting-edge resources, distinguished faculty, top clinical experiences, and access to leading healthcare partners to shape the future of nursing and influence our world's health and well-being. That is just part of what makes the Nell Hodgson Woodruff School of Nursing the No. 1 School of Nursing in Georgia and one of the nation's top 5 schools

In 2023, *U.S. News & World Report* ranked the school’s graduate programs #1 overall, its Doctor of Nursing practice program 6th, and its family nurse practitioner program 5th in the nation. Major programs include the Fuld Fellowship, targeting second-career students with interest in serving vulnerable populations or palliative care patients; the Lillian Carter Center for Global Health and Social Responsibility; and the Maternal and Newborn Health in Ethiopia Partnership. The school’s ranking is 3rd nationally in NIH funding among schools of nursing and received $20 million in external sponsored funding and $15 million in National Institutes of Health research funding in fiscal year 2023.

The school offers a dual-degree program with several colleges, providing undergraduates with a strong background in liberal arts and nursing. The school’s master’s program offers opportunities to specialize in advanced nursing practice in nine specialty areas with training provided in a number of clinical settings and roles. Our DNP program focuses on two tracks: Health Systems Leadership and Community. Graduates of our programs are qualified to seek certification as nurse practitioners, nurse midwives, and/or clinical nurse specialists. A dual-degree master’s program is available with the Rollins School of Public Health, as is a dual master’s in bioethics with the Laney Graduate School. The school’s PhD program is focused on generating new knowledge to improve health and health care quality and developing the next generation of nurse scientists and educators who will change the face of health care. The program also prepares our students to become researchers, and since 2010, our PhD students have received 12 NIH NRSA fellowships.  The school offers accelerated BSN/MSN and distance-based BSN programs for students with degrees in other fields who want to serve the community as advanced practice nurses.

The school has 204 full and part-time faculty and instructors, and students can learn from adjunct faculty at some 500 clinical sites, including an alternative winter break in three countries and a multi-university, multidisciplinary summer program with Georgia migrant farmworkers. The school has more than 9,000 living alumni.

### Rollins School of Public Health

Founded in 1990, the Rollins School of Public Health has 1,164 master’s degree students and 180 PhD students who choose from degree options in behavioral sciences and health education, biostatistics and bioinformatics, epidemiology, environmental health, health policy and management, and global health. A leader in interdisciplinary studies, the school offers dual-degree programs with medicine, nursing, physician assistant, physical therapy, business, theology, law, and the graduate school. A distance-based master’s program, the Executive MPH, allows professionals to pursue a degree while they are employed.

Many of the more than 300 full- and part-time faculty and over 450 adjunct faculty in six academic departments are linked by appointments, shared programs, or research grants with the CDC, Carter Center, American Cancer Society, CARE, Arthritis Foundation, Task Force for Global Health, and state and local public health agencies. Through these partnerships and in its role as a center for international health research and training, the school helps make Atlanta a worldwide destination for public health.

### Georgia Clinical & Translational Science Alliance (CTSA): Overview

The Georgia Clinical and Translational Science Alliance (CTSA) is one of over 50 NIH-funded consortiums. The vision of the consortium is to train the next generation of clinical investigators, translate laboratory discoveries into treatments for patients, and engage communities in clinical research efforts. The CTSA's goals are to improve national health by advancing the implementation and the efficiency and quality of translational research outcomes.

The Georgia CTSA involves a unique statewide collaboration between 4 cornerstone universities, Emory School of Medicine, Georgia Institute of Technology, Morehouse School of Medicine, and the University of Georgia. Emory is a national leader in health care and biomedical research as well as an outstanding leader in clinical and translational research training and education. Georgia Tech is a nationwide leader in biomedical engineering and the application of innovative systems engineering to health care solutions. Morehouse School of Medicine is a nationally recognized historically black institution that brings ethnic diversity to biomedical research, addresses health disparities through successful community engagement research, and serves as a pipeline for training minority researchers. UGA has a proven track record in outstanding laboratory, pharmaceutical, veterinary, educational and translational research and, as the State’s land-grant institution, offers a robust statewide network that enhances community outreach, service, and research. These institutions extend their current partnerships in healthcare, education, and cutting-edge interdisciplinary research to maximize the Georgia CTSA outcomes.

Beyond academia, the Georgia CTSA also has partnerships with multiple healthcare networks, biomedical entrepreneurs, life-science non-profits, professional societies and visionary health leaders. Synergistically, the organizations leverage their unique strengths to accelerate clinical and translational research, education, and community engagement to impact health in Georgia and beyond. The Georgia Clinical & Translational Science Alliance is supported by the National Center for Advancing Translational Sciences of the National Institutes of Health under Award Number UL1TR002378. To learn more about the Georgia CTSA go to: [GeorgiaCTSA.org/](http://georgiactsa.org/community/index.html)

### Children’s Healthcare of Atlanta

Children’s is a national leader in inpatient days, admissions, surgical admissions and emergency department visits. In 2023, Children’s managed:

* 1,188,300+ patient visits
* 450,000+ unique patients (from all 159 counties in Georgia)
* 28,300+ hospital discharges
* 188,600+ inpatient days
* 1,151,000+ outpatient visits
* 44,400+ surgical cases (inpatient and outpatient)
* 245,600+ Emergency Department visits
* 178,800+ Urgent Care Center visits
* 20,700+ primary care visits
* 68,600+ calls to our nurse advice line from parents across Georgia

We serve diverse patients from across the State of Georgia: in 2021, the population Children's served was 37% White, 37% Black, 18% Hispanic/Latino, 4% Asian and 4% 'Other'.

Children’s consists of 3 pediatric hospitals, the Center for Advanced Pediatrics, Marcus Autism Center and 18 neighborhood locations including 8 urgent care centers, and 22 cardiology clinics across Georgia.

Patients have access to over 2,300 pediatric physicians and allied health practitioners representing more than 60 pediatric specialties and programs. In 2021, Children’s managed 12,587 telemedicine visits. There are more than 14,000 employees.

 The hospitals are:

* Arthur M. Blank (replacing Egleston), 446 patient beds.  Annual patient totals: Managed 302,974 patient visits and 70,007 Emergency Department visits. Handled 13,551 surgical cases, including inpatient and outpatient. Managed 84,464 inpatient days.
* Hughes Spalding 24 licensed beds. Annual patient totals: Managed 80,100 patient visits and 49,315 Emergency Department visits. Managed 1,565 inpatient days.
* Scottish Rite 319 licensed beds.  Annual patient totals: Managed 369,497 patient visits and 95,763 Emergency Department visits. Handled 28,395 surgical cases, including inpatient and outpatient. Managed 82,959 inpatient days.

**A large building with glass windows

Description automatically generatedArthur M. Blank hospital (AMBH)**, which replaces the Egleston campus that was long the main Children’s Healthcare of Atlanta campus, opened in September of 2024. Located on a campus of 70 acres in Atlanta’s North Druid Hills area, AMBH is a 19 story and 2 million ft2 facility. This campus is a huge leap forward in how we care for Georgia’s kids. Here are just a few of the highlights:

* 19 stories, 2 million ft2
* 446 patient beds, which is116 more patient beds than currently at Egleston hospital, helping us treat more kids and be well-positioned as the region grows and our approaches to treatment change over time
* Larger, private rooms so parents can comfortably stay with their children during their most challenging times
* Convenient amenities for families: washers and dryers, family lounges and kitchenettes on every floor, with child life activity rooms throughout
* More than 20 acres of greenspace, which allow for miles of walking trails and healing views from patient rooms, as research shows exposure to nature reduces the need for some medications and improves outcomes
* More than double the conference and simulation space than at Egleston hospital, to help train fellows and allow our clinicians to stay current with best practices
* A 70,000 square-foot Emergency Department—nearly three times the Emergency Department space at Egleston Hospital—with 69 emergency exam rooms
* A Special Care Unit (SCU) within the new Emergency Department for the treatment of patients with potentially highly infectious disease cases
* The only dedicated Level 1 pediatric trauma center in Georgia
* The use of sustainable materials has been prioritized in the planning and design process for energy and water efficiency. Our Center for Advanced Pediatrics is Leadership in Energy and Environmental Design (LEED) Gold certified, and our newly opened Support Center and future Arthur M. Blank Hospital are on track to earn LEED Silver certification

Children’s is one of the largest pediatric clinical care systems in the country and is consistently ranked among the top pediatric hospital systems in the country (e.g., by U.S. News & World Report). Children’s is the only healthcare system in Georgia solely dedicated to kids. In 2020, the benefit Children’s provided to the community totaled $300.3 million. In 2021, approximately 58% of our unique patients were on Medicaid, PeachCare for Kids or unable to cover the cost of their care. In order to serve more children in 2022, we have updated our charity care policy to provide 100% charity care for families earning up to 400% of the federal poverty guidelines and a sliding scale for families earning up to 600% of the poverty guidelines.

Children’s was formed in 1998 when Egleston Children’s Healthcare System and Scottish Rite Medical Center joined to form a unified healthcare system. In February 2006, Hughes Spalding Children’s Hospital joined the healthcare system. Children’s is a not-for-profit corporation. A complete array of pediatric subspecialties is available through pediatric physicians affiliated with Children’s, including allergy/immunology, cardiology, cardiothoracic surgery, critical care, orthopedics, otolaryngology, hematology/oncology, neurology, neurosurgery, gastroenterology, neonatology, transplant medicine, infectious diseases, psychiatry, and other specialties.

Children’s is home to the only two Magnet®-designated pediatric organizations in Georgia. In 2018, 2019, and 2020 respectively, the Egleston and Scottish Rite hospitals of Children’s received initial Magnet® designation by the American Nurses Credentialing Center (ANCC), being recognized for superior nursing standards in the delivery of quality patient care, leading to the highest levels of patient safety, quality and patient satisfaction.

The Children’s Healthcare of Atlanta and Emory University relationship facilitates leading-edge pediatric research, training and innovation to deliver unique care and the best outcomes possible for patients and families. In 2021, we totaled 3,715 visit hours in the Children’s Pediatric Research Unity. Children’s received $72.5 million in funding from NIH and $101.4 million in total extramural funding. In the 2020-2021 academic year, 723 residents and fellows were trained in 30 pediatric residency programs and 49 pediatric subspecialty fellowship programs.

Our investigators continued to advance groundbreaking work, with multiple publications in high profile scientific journals. We now average over 750 publications annually. In 2021, 3,211 Children's patients enrolled in a clinical research study, and of those, 764 enrolled into a clinical trial. Throughout the year, our clinical teams managed more than 12,000 patient visits where research was conducted. These investments in research are directly resulting in improvements in clinical care.

In 2023, Strong4Life continued to focus on childhood obesity, illness and injury prevention, child protection, and behavioral and mental health. Together, our child advocacy efforts through Strong4Life reached:

* 814,000+ children
* 906 schools
* 856 clinicians
* 16,000+ key stakeholders

Our Obesity Prevention programs:

* Reached nearly 300,000 kids, 210 schools and 94 early care centers
* Trained 566 providers

Our Behavioral and Mental Health programs:

* Reached 117,000+ children with programs and messaging aimed to build resilience.
* Trained 176 clinicians, 163 schools and 39 early care centers in behavioral and mental health resiliency.

Our Injury and Illness Prevention programs:

* Reached 420,100+ children.
* Certified 6,374 people in CPR/AED training across Georgia through Project S.A.V.E. and added 51 new Heart Safe Schools
* Provided 700 swim lessons to kids in collaboration with YMCA of Metro Atlanta and hosted land-based safety around water classes for 2,300 children

Our Child Protection programs:

* Reached 12,000+ children with child protection programs that address child abuse, child neglect and child sex trafficking
* Trained nearly 300 caregivers and more than 900 youth on online safety

### Children’s Healthcare of Atlanta: Clinical Research Staff

***The Children’s Healthcare of Atlanta Clinical Research Staff Support Model*** was developed more than 15 years ago to provide the research operational needs for Principal Investigators conducting research within Children’s. The core of highly qualified and trained clinical research coordinators, nurses, assistants, and interns are managed by 5 Clinical Research Managers located on each campus: Egleston, Scottish Rite/Hughes Spalding, Center for Advanced Pediatrics, Marcus Autism Center, and within our AFLAC Cancer Center’s CRO. These managers oversee a team of more than 100 clinical research professionals who partner with more than 150 Principal Investigators across our many subspecialties. While several have set study teams, there is also opportunity for Investigators to utilize the experienced pool of research coordinators on an as-needed basis. To facilitate acute access to research staff, Children’s implemented an expedited position approval process for extramurally funded positions in 2019. Research projects can be serviced immediately by clinical research campus managers while permanent staff is hired and onboarded, if needed. Research staff are specifically trained by the Children’s Clinical Research Department’s dedicated Research Educator in collaboration with their campus Manager to conduct all research activities according to federal regulations, institutional policies and procedures, and ICH/GCP guidelines. Study specific training is completed by sponsor resources or the Principal Investigator and documented accordingly in the study’s education log.

Clinical Research Support Training and Development: Children’s Clinical Research Department provides consistent, cross-campus onboarding, training, and on-going development to all our clinical research staff.  Research relevant training and career development activities include but not limited to:

* For Emory-IRB approved studies:  Mandatory, live--“Introduction to Clinical Research at Emory for Coordinators and Nurses”.
* Mandatory Children’s computer-based training--“Children’s Research Process Training” completed at hire and annually.
* Completion of Children’s Research Department’s Orientation Checklist within 90 days of hire with Manager confirmation signature.
* CITI Program human subject’s protection training every 3 years, including GCP.
* Mandatory in-person Children’s Research Administration Orientation within first month of hire.  Presenters include representatives from the IRB, Research Compliance, and Research Finance.
* Individualized coordinator/nurse training with the Research Educator on items such as informed consent training and review of internal audit findings identified by Children’s Compliance Department during routine reviews.
* Children’s Research Mentorship Program with annual mentor/mentee pairings.
* Quarterly clinical research department staff meetings where new policies, procedures, or regulation changes are reviewed.
* Monthly research educational seminars offered on campus and on-line, such as:  Pediatric Research “K-Club” Meeting Series, Research Resources 101, Coordinator Meetings, Emory Department of Pediatrics’ Grand Rounds and Pediatric Research Seminars.
* Study-specific research conferences, SoCRA and/or ACRP Research Conferences, and the Southeastern Pediatric Research Conference held annually.

Clinical Research Support Resources: The clinical research support team has access to all Children’s and Emory subject matter experts in the following areas: IRB, Research Compliance, Research Education, OSP, ORA, Research Leadership, and any Children’s Clinical ancillary or professional partners for queries and on-going training needs.  All Children’s and Emory Institutional policies and procedures are readily accessible via Children’s and Emory intranets.  Additionally, helpful tools such as study start-up, close-out, and project transfer checklists, forms and templates for regulatory documents, and past research training sessions and webinars are also posted for easy access.

### Children’s Healthcare of Atlanta: Clinical Research Staff Development

Children’s Healthcare of Atlanta employs a full time Research Educator who works specifically with the clinical research staff. The educator collaborates with our institutional partners at Emory University and others to plan, develop, train, and implement research priorities across the enterprise.

All research staff working on Emory IRB approved projects are required to complete a live course- “Introduction to Clinical Research at Emory for Coordinators and Nurses”. This course is designed to provide a basic framework of the roles and responsibilities for clinical research staff to highlight the tools to needed to successfully perform their job. The course introduces the new and existing clinical research staff to the federal regulations governing the conduct of clinical research including relevant institutional policies and procedures. The course also provides an integrated and practical overview of the operational procedures to facilitate compliance in clinical research.

Employees are also required to complete the online training titled “Children’s Research Process Training” at hire and annually. This course is divided into three segments; Study Start-up, Study Conduct, and Study Closeout, and is designed to educate the research coordinator or nurse about the entire life cycle of a research project at Children’s.

In addition, Children’s hosts quarterly staff meetings. These meetings cover a wide array of topics and are frequently used to introduce significant changes to policies/procedures, roll out new system initiatives, introduce changes to processes or federal and regulatory rules.

New Children’s employees are required to attend an in-person Research Administration Orientation (RAO) within the first month of employment. During the RAO, representatives from the IRB, Research Compliance, and Research Finance discuss their specific areas and how they will interface with the coordinator or nurse. Research specific SOP’s are also reviewed during the RAO. Children’s policies, SOP’s and guidelines are housed on our internal website, Careforce Connection, and can be accessed by all Children’s staff or those with sponsored accounts from other institutions.

Individualized coordinator/nurse training with the Research Educator is available as well. Mock consent training is the most commonly used service provided by the educator; however, other ad hoc training is also available. The educator partners with the research compliance team to address items identified by their audit program and ensure proper adherence to federal regulations, institutional policies and procedures, and ICH/GCP guidelines. Children’s research managers also complete an orientation checklist with each employee to verify mastery of key concepts related to their role as a research coordinator or nurse.

We believe that continuing education beyond what is offered here at Children’s is important and provide funds for four staff members per year to attend national conferences via a scholarship program. Our primary focus is on the conferences hosted by the two main research professional associations (Association of Clinical Research Professionals and The Society of Clinical Research Associates), but other conference attendance is supported as well.

Children’s and Emory partner to host a monthly meeting that covers a variety of research topics from federal regulations to specific operational issues. The sessions are teleconferenced to reach a broader audience.

Lastly, Children’s requires human subjects’ protection training every three years via the CITI program. The CITI GCP module is required every three years for federally funded studies but is recommended as best practice regardless of the funding source.

### Children’s Healthcare of Atlanta: Investigational Drug Service (IDS) Pharmacy

The Children’s Healthcare of Atlanta Investigational Drug Service (IDS) Pharmacy is a joint venture of the Children’s Department of Pharmacy and the Department of Clinical Research. The IDS pharmacy manages the investigational medications for over 140 clinical trials conducted on the various campuses in the Children’s system. The IDS pharmacy is staffed by two full time pharmacists and one full time pharmacy technician/assistant. The hours of operation are 8:00 am - 4:30 pm, Monday-Friday. The services and staff of the main hospital pharmacies are utilized to support trials requiring off-hours support. Various services provided by the IDS pharmacy include protocol review, budget preparation, staff education, receipt of study medications, IWRS system documentation, inventory maintenance, dose preparation, medication dispensing, subject randomization, subject and family education, invoice preparation and billing, periodic meetings with study monitors, final disposition of study medications, preparation and shipping of study medications, transfer of study medications among the various campuses, and compounding services (see below a detailed list of services provided by the IDS pharmacy).

|  |  |
| --- | --- |
| Services provided by the Children’s Healthcare of Atlanta Investigational Drug Service (IDS) Pharmacy | |
| Study Initiation | Review protocol Prepare budget Receive and process initial shipment of study drug Prepare study fact sheet for staff In-service staff (as needed) Work with pharmacy IT staff to create drug build in Epic Prepare preprinted labels (as needed) |
| Study Maintenance | Maintain appropriate inventory storage Maintain study records Meet with study monitors Order and receive inventory Process expired inventory Process patient returns Store patient returns for monitor Process drugs for onsite destruction Periodic study billing |
| Study Closeout | Process study drug for return to sponsor / onsite destruction Process study records to archive Meet with study monitor for closeout visit Final billing |
| Dose Preparation | Retrieve and sign out inventory Calculate dose/volume (as needed) Order entry / verification in computer Prepare dose Dose labeling |
| Prescription Dispensing | Retrieve and sign out inventory Order entry into computer Prepare prescription Prescription labeling Patient/family education IVRS documentation (when required) Prepare for shipping (as needed) |

### Children's Healthcare of Atlanta: Center for Advanced Pediatrics (CAP)

The Center for Advanced Pediatrics (CAP) at Children’s Healthcare of Atlanta (Children's) is a 260,000 square foot outpatient clinic facility that utilizes a multidisciplinary, coordinated care approach to provide treatment to children and teens with chronic diseases and complex care needs by enabling access to multiple specialized health services in one place. Servicing thousands of families across Georgia, the center brings together over 20 pediatric specialties under one roof, harnessing the expertise and skills of more than 450 physicians and staff. The center’s multidisciplinary framework merges both clinical and research services to provide patients with optimal treatment options and state of the art care. Children’s is one of the largest pediatric healthcare organizations in the United States, and CAP is the first building of its kind for pediatrics in Georgia, conducting state of the art research and providing more than 100,000 patient visits per year.

CAP’s pediatric specialists provide treatment to a significant number of children with medically complex conditions who require multidisciplinary, coordinated care to optimize their outcomes. Providing “patient-centered” care, the center allows access to specialized programs and services, improved appointment availability, and a “child-friendly” design and setup. Space for collaborative physician consultations, central locations between all three hospital campuses, and specialized exam rooms for medically complex patients help to enhance and facilitate coordinated care and physician workflow. Phlebotomy, x-ray and lab services are strategically located in the CAP building to further promote efficient, timely and seamless care delivery. The center’s comprehensive health delivery model facilitates care integration, enhances care delivery, and improves clinical trial capabilities.

Providing patients access to leading-edge clinical research opportunities is another specialized feature that enhances the center’s multidisciplinary and coordinated care environment. The CAP houses resources essential to conducting rigorous research including investigational drug services, a Children’s-run Clinical Research Laboratory, an Emory-run processing lab, and courier services to transport samples according to established protocol between facilities and campuses. CAP also serves as home to the Pediatric Research Unit (PRU), which provides over 4,000 square feet of clinical research space and infrastructure for pediatric researchers to conduct innovative research. Researchers at CAP are involved in more than 600 active research studies to improve child health. Studies span 28 specialty areas, with an emphasis in cancer and blood disorders, concussion, heart disease, kidney disease, liver disease, neurosciences, [orthopaedics](https://www.choa.org/research/studies-and-clinical-trials/orthopaedic-research) and cystic fibrosis.

### Children's Healthcare of Atlanta: Pediatric Research Unit (PRU)

The Pediatric Research Unit (PRU) provides the space and infrastructure for pediatric researchers to conduct innovative research to treat childhood illnesses and injuries, giving children and their families an opportunity to take part in leading-edge clinical trials.

Located on the fifth floor of the Center for Advanced Pediatrics (CAP), the PRU provides 4,237 square feet of clinical research space. The outpatient clinical research unit includes six private rooms: three with beds, one with an exam table and two with infusion chairs. All have the capacity for full cardiorespiratory and vital sign monitoring. There is also an observation room with two chairs and an intake room equipped with a stadiometer, infant through adolescent scales and vital signs equipment. There is a nurse’s office and an open workstation with ten computers available for coordinator and investigator use along with a registration area. Additionally, there is a large supply storage area, family nourishment room, soiled utility room, large medical records space and small conference room. Within CAP, there is also a café, beautiful outdoor gardens, and wireless internet access.

The PRU at CAP offers access to many of Children’s clinical services and departments, including radiology, EKGs, and a clinical laboratory for research only resulting and research lab processing.

A dedicated and fully equipped Investigational Drug Services (IDS) office covers 672 square feet within the PRU and is staffed by a research pharmacist and pharmacy tech. The IDS includes an anteroom and a hazardous medical prep room as well as ample storage for current and future trials.

The PRU staffs trained research nurses to perform medication administration, intravenous access and port access, vital signs monitoring and assessment, phlebotomy and other timed specimen collections including Pharmacokinetics Studies (PK) studies and oral glucose tolerance tests (OGTT).

### Children's Healthcare of Atlanta: Research Lab Processing

Center for Advanced Pediatrics (CAP)

Labs can be processed for shipping in the Research Core lab located on the first floor of CAP. Also in CAP is a CLIA-certified, clinical lab capable of on-site resulting from a specified test menu. For clinical labs not offered on-site, there is an established process to courier specimens to Egleston's Main Lab for processing results. Additionally, core laboratory services are offered at both the Egleston and Scottish Rite campuses of Children’s and include sample processing and aliquoting, short-and long-term sample storage in ultra-cold freezers, and IATA certified shipping.

Scottish Rite

Lab resources at Scottish Rite include a research coordinator desk, a sample bench processing and aliquoting area for use by Children's research laboratory staff and trained study staff members, general and refrigerated centrifuges and microcentrifuges and 1 [-80oC], 1 [-20oC] and 1 [4oC] freezer for sample storage. All freezers/refrigerators are equipped with 24-7 iSensix temperature monitoring alarm systems.

Egleston

Lab resources at Egleston include a research coordinator office, a sample bench processing and aliquoting area for use by Children's research laboratory staff and trained study staff members, general and refrigerated centrifuges and microcentrifuges and 1 [-80oC], 1 [-20oC] and 1 [4oC] freezer for sample storage. All freezers/refrigerators are equipped with 24-7 iSensix temperature monitoring alarm systems. Investigational Pharmacy Services provided include pharmacy expertise for researcher protocol planning, set-up, and initiation; ordering and maintenance of investigational drug inventory per sponsor, state, and federal requirements; preparation of investigational drug information fact sheets for pharmacy and nursing staff to fit researcher protocol needs; and compounding and dispensing investigational medications per protocol requirements.

### Children's Healthcare of Atlanta: Egleston Research Space

Satellite research space at Egleston hospital provides space for research study visits that include services not offered at CAP such as MRI, CT, and the Cardiovascular Imaging Research Core. The fully equipped two-bed patient area is located on Egleston’ s ground floor in the sleep lab area and is staffed by Pediatric Clinical Research Unit (PCRU) team members. Use of this space for visits not offering services in CAP also includes access to all Children’s clinical services and departments including but not limited to radiology, cardiology, vascular access teams, sedation services, and Canines for Kids pet therapy. Additionally, participants enjoy access to family-centered amenities including wireless internet, an exercise area, sleep rooms, and a business center, family library, cafeteria, and coffee shop.

### Emory Health Sciences Research Buildings

### HSRB I

The Health Sciences Research Building (HSRB) opened its doors in April 2013. This state-of-the-art research space is located directly adjacent to the Emory-Children’s Center and connected via a two-story bridge. This four-story building includes 190,000 GSF, with over half the space (115,000 GSF) dedicated to research within the Emory Department of Pediatrics. An open lab concept features natural light in labs and corridors. The building features a 160-seat auditorium and a cafe dining area with an outdoor seating option. The building houses 500 people, including 74 faculty researchers and their teams of postdoctoral fellows, graduate students, and staff.

The building includes biosafety level 2 and 3 labs. The BSL-3 Laboratory is located on the 4th floor. This specialized facility is a total of 425 ft2 of shared BSL3 laboratory space. The BSL3 laboratory consists of 6 separate rooms including a doffing and donning area with included shower and sink, PPE storage, common storage including a flammable cabinet and autoclave, and two designated work suits of 100 sq ft each (E-499-A/B) which house the needed equipment. The dedicated equipment for this space is two -80C freezers, centrifuges, water bath, scopes, a pass through autoclave, flammable cabinets, and a dedicated computer.

Research in HSRB is designed to facilitate multidisciplinary child health research collaborations with space dedicated to drug discovery, immunology and vaccines, neurosciences, cancer, gastroenterology, transplant immunology, nephrology, biomedical engineering, and human genetics. The two-story working bridge that connects HSRB to ECC houses researchers dedicated to informatics, outcomes research, public health research, and clinical research.

An IACUC-approved 13,944 square foot animal vivarium is located in the basement of the HSRB Building. This animal facility is designed on a single corridor concept and contains rodents and fish with the intent to maintain rodents at a higher health standard than the convention for the campus (i.e. free of Murine Norovirus, Mouse Parvovirus, Helicobacter species, and fur mites enzootic to varying degrees in Emory mouse colonies). It includes microisolator ventilated cages for housing mice, surgical, and procedure rooms. This is Emory University’s first virus antibody free (VAF) animal facility. Under this new and elevated level of animal health maintenance there are special training, access, and traffic control measures. A gnotobiotic facility is being established in a portion of the HSRB vivarium and currently houses 6 isolator units.

Veterinarians and care staff are available for consultation on routine and special procedures, and on call after work hours and on holidays. Investigators using rodents of a lesser health status use the ECC animal research facility immediately across the street and accessible by bridge.

A picture containing building, outdoor

Description automatically generated**HSRB II**

Figure 1: HSRB I and II at Emory

HSRB II incorporates 1,200 biomedical researchers from neurology, pediatrics, cardiology, vaccinology, and oncology across eight stories and 350,000 square feet. Its open experimental spaces are designed to foster collaboration and innovation among fundamental, translational, and clinical researchers from across the medical sciences.

#### Laboratory facilities

The eight-story building includes over 120,000 feet of experimental and computational space. Open labs and workspaces with soft barriers are designed to facilitate rapid discovery. The building’s first floor is dedicated to an innovation center that includes an accelerator space for startups and entrepreneurial research to pair research with industry. Labs include an Innovation Center for biomedical engineering; a Radiochemistry lab and Radiopharmacy for cancer research and treatment; and an Animal/Biosafety Level 3 Lab (A/BSL3) for animal studies.

##### Innovation center

Located on the first floor of HSRB II and serving as part of the biomedical engineering program shared by Emory and Georgia Tech, the Innovation Center provides four core services in biomedical engineering: 3D-printing and 3D-BioPrinting; Micromachining; Extended Reality (XR); and Education and Networking in Bioentrepreneurship. These core services grant researchers access and training in eight different 3D printers; a laser engraver; plasma and ultrasound cleaners; a vacuum oven; soft lithography and microfluidics workspaces; four different types of VR headsets and clinical study support for extended reality applications in the medical sciences; and regular educational programming and networking opportunities to assist researchers with bringing medical technologies to the market. In addition, the Center also provides manufacturing, project feasibility and follow up consultations, and metrology and culture tools for early-career researchers who are interested in engineering biomedical interventions.

##### Radiochemistry lab and radiopharmacy

The CSIC’s radiochemistry lab and radiopharmacy are located in approximately 4,200 square feet on the G2 level of HSRB II. Included in this suite is a General Electric PETrace 880 18MeV self-shield cyclotron. This cyclotron allows the production of Fluorine-18, Carbon-11 (carbon dioxide), Nitrogen-13 (ammonia), Oxygen-15, and Gallium-68. The cyclotron includes the PROCAB processing system for Carbon-11 and a processing system for conversion of Oxygen-15 into [O-15]Water.  The high energy cyclotron allows for single bombardment production of energies up to 100uA or dual bombardment up to 130uA, and also has the capability of Deuteron beam at 8.4MeV for production of Oygen-15 without enriched target material. The transfer of radioisotopes from the cyclotron to the Radiopharmacy and Radiochemistry Labs is via a Von Gahlen Active Distribution System providing the delivery of isotopes to a variety of locations within the labs.

#### Core facilities

Core facilities include advanced imaging, flow cytometry, a biorepository, genomics, and other technologies. Spreading these core functions throughout the building encourages interaction among experimentalists, computationalists, and core service providers.

##### Center for Systems Imaging Core (CSIC) at Emory university

The Center for Systems Imaging Core (CSIC) is an Emory University School of Medicine core lab dedicated to providing state-of-the art human and pre-clinical imaging, as well as radiopharmaceutical development to the Emory community. CSIC is the cross-disciplinary scientific, administrative, and educational home for imaging sciences at Emory University. The goals of this center are to: (1) support the advancement of scientific research focused on the development of imaging biomarkers, (2) promote the development and application of biomedical imaging technology particularly magnetic resonance imaging, (3) provide core services for human and animal imaging studies, and (4) to build cross-cutting educational and training programs.



**CSI Entrance**

Figure 2: HSRB II Building at Emory

A room with chairs and a table

Description automatically generatedThe CSI Core is housed in approximately 22,600 square feet across the Emory campus. This total includes a 18,700 square foot facility (G1 10,950, G2 RP 4230, G2 MR 3520) in the Health Sciences Research Building, 800 square feet in Emory University Hospital (EUH), 400 square feet in the Whitehead Biomedical Research Building (WBRB), 2,000 square feet in the Brain Health Center at Emory ‘s Executive Park Campus Building 12 (EP12), and 700 square feet of shared clinical/research space at The Emory Clinic building C (TEC). The director of CSIC is John Oshinski, PhD (jnoshin@emory.edu) and the Medical Director is Jason Allen, MD, PhD (jason.w.allen@emory.edu). Co-directors are Shella Keilholtz, PhD (pre-clinical MRI), Deqiang Qiu, PhD (MRI), Steven Liang, PhD (PET and Radiochemistry). There are 11 staff members including MRI and PET Technologists, Radiopharmacists, and scientists to provide computer, MRI physics, and small animal support services.

Figure 3: Waiting Rooms

### Emory-Children's Center (ECC)

Emory-Children’s Center (ECC) was constructed in 2004 and is designed for optimal performance of modern biomedical research. This facility is a five-story building that includes 64,500 square feet of research space, an active pediatric subspecialty clinic on floor one staffed by Emory faculty physicians and operated by Children’s Healthcare of Atlanta, and a 12,500 square foot small animal vivarium in the basement. The ECC building is occupied by the Emory Department of Pediatrics with first floor clinic space leased to Children’s Healthcare of Atlanta. Department of Pediatrics faculty are actively involved with pediatric clinical care, teaching, research and child advocacy efforts throughout the building and the physicians and staff of Emory-Children’s Center are developing critical research programs across a variety of child health-related areas. The ECC building is physically connected to the Health Sciences Research Building via a functional two-story bridge.

BSL-2E Laboratory, 5th Floor

This specialized facility is a total of 498 sq ft of dedicated laboratory space. It has directional airflow and is HEPA filtered but not to BSL-3 standards. It also includes self closing doors, hands free sinks and a 75 sq ft anteroom for donning/doffing PPE. The dedicated lab procedure room space is equipped with the following:

                5 x Class 2 A2 Biosafety cabinets

                6 x CO2 incubators

                1 x -80C freezer

                1 x -20/4C freezer/fridge combo

                1 x 90K optima Beckman ultra centrifuge

                1 x Allegra X14R Beckman table top centrifuge

                1 x pass through autoclave

                1 x 18ohm water (RO tank system that feeds into a MilliQ system)

ECC Animal Space

An IACUC-approved 12,500 square foot small animal vivarium is located in the basement of the ECC building. Housing is available for rodents and *Xenopus*. The facility is managed by professional staff of the Emory Division of Animal Research (DAR). Veterinary services with DAR include vendor surveillance, quarantine and isolation, preventive medicine, daily observation, treatment and intervention for injury or illness, health evaluations of sentinel animals, necropsy, histopathology, parasitology, microbiology, serology, hematology and blood chemistries. Veterinarians and care staff are available for consultation on routine and special procedures, and are on-call after work hours and on holidays. Investigators using rodents of higher health standard than the convention for the campus use the HSRB animal research facility immediately across the street and accessible by bridge.

### Emory-Children’s Center: Research Unit (ECC-RU)

The **Emory-Children’s Center Research Unit (ECC-RU)** is a 984 square foot unit located on the first floor of the Emory-Children’s Center. The Emory University space managed by the Department of Pediatrics is dedicated to clinical research activities and is available for IRB-approved protocols conducted by Emory or its academic partners. The unit contains a research staff workroom, four exam rooms, two interview rooms, and a storage room. Phlebotomy services are also offered. The ECC-RU is self-service and appointments may be booked in a dedicated on-line scheduling system at which time the study staff will gain access for the informed consent process and subsequent study participant interactions.

### Pediatric Research Alliance Centers

The **Pediatric Research Alliance Centers** were launched in 2007 via an initial $430M endowment from Children’s Healthcare of Atlanta (Children’s) to enhance the research infrastructure towards supporting and facilitating child health research in the Atlanta area. This effort has been extremely successful in bringing together multidisciplinary groups from multiple institutions to collaborate on research topics important to child health. It is now jointly sponsored via a financial investment from Children’s, the Emory University Woodruff Health Sciences Center and Georgia Institute of Technology (GA Tech) resulting in a unique collaboration between a children’s hospital, an academic medical center and a state university. The collective Children’s-Emory-GA Tech initiative has resulted in robust research centers that offer a thematic home for basic, translational and clinical investigators to interact and collaborate.

**Pediatric Research Centers:**

* Aflac Cancer and Blood Disorders Center: As one of the leading pediatric oncology, hematology, and blood and marrow transplant programs in the country, the Aflac Cancer and Blood Disorders Center of Children’s Healthcare of Atlanta and Emory University is committed to developing new techniques, treatments and cures to advance research and medicine in pediatric hematology/oncology. Our rapidly growing research program includes more than 100 physicians and researchers in the following fields of study:
* Blood and Marrow Transplant (BMT)
* Brain Tumors
* Cancer Survivorship
* Cell and Gene Therapy
* Hemostasis and Thrombosis
* Leukemia and Lymphoma
* Psychology
* Sickle Cell Disease
* Solid Tumor
* Transfusion Medicine

At the Aflac Cancer Center, we are uniquely positioned to leverage the vast capabilities in Atlanta through collaborative relationships with Winship Cancer Institute of Emory University, Georgia Institute of Technology and the Centers for Disease Control and Prevention. These collaborations provide a significant opportunity to seek answers to the most challenging pediatric hematology/oncology conditions.

* Center for Childhood Infections and Vaccines (CCIV): Atlanta is a leading global center of infectious diseases research, rooted in research strengths at Emory University and the Centers for Disease Control and Preventions (CDC). Investigators from a number of additional institutions add to strengths in this area, including Georgia Tech, Morehouse School of Medicine, The University of Georgia, and the Medical College of Georgia. Children’s Healthcare of Atlanta builds on these strengths through the Center for Childhood Infections and Vaccines (CCIV), working with partner institutions, to address major childhood infectious diseases through innovative research into microbial pathogenesis, immune responses in children, and the development of new vaccines and therapeutics.

To achieve the overarching goal of impacting child health on a global scale, CCIV:

* + Enhances understanding of infectious diseases, basic immunologic processes, and the development of vaccines and treatments against childhood pathogens.
  + Builds new collaborations and interdisciplinary projects leading to new extramural funding.
  + Develops a program and critical mass of investigators focused on infectious diseases and emerging global health issues. In that vein, CCIV integrates efforts with those at the Emory Vaccine Center, Emory Transplant Center, the Carter Center, the Emory Global Health Institute, and CDC initiatives. Participation in CCIV initiatives is open to investigators from these and other research institutions throughout the state of Georgia.

CCIV has five integrative focus areas that are designed to build new collaborations, leading to sustainable research programs, new grant opportunities and important discoveries.

* Center for Cystic Fibrosis and Airways Disease Research (CF-AIR): The Center for Cystic Fibrosis and Airways Disease Research (CF-AIR) is the home for two research programs, one focused on cystic fibrosis (CF), and one focused on asthma. Research in other airway diseases, such as COPD and non-CF bronchiectasis, also is of interest.
* Children's Center for Pediatric Cellular Therapies (CPCT): The Center for Pediatric Cellular Therapies provides the leadership and expertise necessary to bring cellular therapies now being developed in the lab, to the bedside. The Center provides an academic home for the entire spectrum of investigators -- basic, translational, and clinical researchers -- working in cell therapy. The overall goal of this center is to streamline the translation of our scientific discoveries into early clinical trials.
* Center for Clinical Outcomes Research and Public Health (CORPH): CORPH was established in January 2011 and is a research center focused on clinical outcomes and public health that promotes the development and oversight of high-quality epidemiologic and clinical research within the Department of Pediatrics at Emory University and Children’s Healthcare of Atlanta. This center aims to understand the end results of specific health care practices and interventions and identifies established investigators to mentor young investigators interested in establishing careers in clinical research. By linking the care people get to the outcomes they experience, outcomes research has become the key to developing better ways to monitor and improve the quality of care.

This center centralizes and coordinates child-health-focused outcomes and epidemiologic research throughout the system, emphasizing strong ties to the Rollins School of Public Health at Emory University and to the Centers for Disease Control and Prevention. CORPH provides a forum for researchers to learn about available resources including suitable funding opportunities, to garner advice about navigating health services research within our system, and to identify collaborators and investigators. The Center synergizes with Children’s Healthcare of Atlanta's plans for new wellness initiatives impacting the health of Georgia’s children

* The Center for Viroscience and Cure (CVC): The mission of Center for ViroScience and Cure (CVC) is to develop therapeutic and curative strategies that improve the lives of the many who are battling acute, chronic and difficult-to-treat virus infections and related complications.

Our researchers have been highly successful in developing small molecules, from discovery to clinical use, for treating devastating human viral infections. Currently, our drug discovery efforts focus on the following areas:

* + Anti-HIV/AIDS drugs targeting replication and various viral reservoirs
  + Anti-HCV drugs targeting viral replication
  + Anti-HBV drugs targeting viral replication
  + Anti-SARS-CoV-2 small molecule inhibitors
  + Anti-Monkeypox virus small molecule inhibitors
  + Anti-Ebola virus drchilderugs
  + Anti-Zika virus drugs
  + Anti-Influenza virus drugs
  + Anti-Norovirus drugs targeting viral replication
  + Anti-Dengue virus drugs targeting viral replication
  + Anti-respiratory syncytial virus (RSV) drugs targeting viral replication
  + Anti-cancer drugs
  + Experimental models for chronic liver disease
* Marcus Autism Center: **Marcus Autism Center** is one of the largest centers for clinical care of autism spectrum disorder (ASD) in the U.S., offering families access to the latest research, comprehensive testing, and science-based treatments. With the help of grants, community support, and government funding, Marcus Autism Center maximizes the potential of children with autism today and transforms the nature of autism for future generations.
* Children’s Center for Neurosciences Research (CCNR): Brain development is a complex, incompletely understood process that presents both challenges and innumerable opportunities for important new discoveries. **Children’s Center for Neurosciences Research (CCNR)** aims to be an internationally recognized center for excellence in which multidisciplinary research teams bring insight from developmental neuroscience to the benefit of children with neurologic disorders.
* Center for Clinical and Translational Research (CCTR): The Center for Clinical and Translational Research is the virtual home for pediatric clinical and translational research. The Center supports innovative clinical research studies and the translation of basic science discoveries into improved child health. The Center integrates closely with the Georgia Clinical and Translational Science Alliance (Georgia CTSA), an NIH/NCRR-sponsored component of the CTSA network.
* Children’s Heart Research and Outcomes Center (HeRO): he Heart Research and Outcomes Center (HeRO) seeks to reduce the morbidity of pediatric heart disease. Our Center will lead the transformation of focused cardiac research in to innovative therapies for young patients. Major areas of research include Regenerative and Nanomedicine Technologies, Cardiac Development, Cardiac Outcomes, Cardiac Devices, and Neurodevelopmental Studies. At HeRO we strive to create the next generation of pediatric-specific therapies. We do this through cutting edge research using nanotechnology, stem cells, and better understanding of normal and abnormal cardiovascular development. We also look at the whole picture: what will happen to these children as they age from a neurodevelopmental standpoint. By researching both daily function and long-term outcomes, we hope to have a better understanding of how we can help these children regain normal function. Our research blends fundamental basic science, with translational and clinical medicine to improve the quality of life of children with CHD.
* Pediatric Technology Center (PTC) at Georgia Tech: The mission of the Pediatric Technology Center is to establish the world’s leading program in the development of technological solutions for children’s health.

Modern biomedical research has made great strides in science and technology that impacts health care, but for the most part these advances have targeted adult populations. While children are often not included in clinical studies, the greatest impact in many areas of health care could be made by identifying and treating disease at the youngest possible age. Children present distinct challenges in all aspects of research and development: they have a different physiology than adults, they grow and change in ways that adults do not, and market drivers for research and commercialization are often seen as less compelling by the private sector.

To accelerate the pace of practical discovery in pediatric medicine, scientists and engineers at the Georgia Institute of Technology work with clinicians and scientists at Children’s Healthcare of Atlanta and other partners on the engineering challenges of translating basic research to clinical practice. These efforts define the Pediatric Technology Center, the only organization in the U.S. designed to address this critical gap. Here, fundamental insights and new tools are combined to develop better ways to diagnose, treat, and cure diseases and conditions that affect children.

The Pediatric Technology Center is led by its Chief Scientific Officer, Dr. M.G. Finn, and a versatile team with expertise in the following areas:

* + Nanotechnology
  + Regenerative Medicine
  + 3-D Printing
  + Diagnostics and Imaging
  + Medical Devices and Device Manufacturing
  + Health Analytics
  + Patient Facing Technologies
  + Medicaid Data for Research
* Children’s Center for Immunity and Applied Genomics (CIAG): The Children's Center for Immunity and Applied Genomics (CIAG) is a multi-faceted center that works closely with physicians and researchers from Children's Healthcare of Atlanta, Emory University, and the Georgia Institute of Technology. With the advances in genomics that have begun to drive personalized and precision medicine, CIAG has made the strategic decision to maintain its focus on immunology while serving as a primary driver of precision molecular medicine for children in Atlanta. CIAG is co-directed by Dr. Subra Kugathasan and Dr. Greg Gibson. The main goals of the CIAG include the following:
  + Conduct precision diagnostics through applied genomics
  + Create personalized management plans to prevent complications, improve outcomes, and enhance the quality of life
  + Develop precision therapeutics through pharmacogenomics, tailoring drug therapies to each patient's genetic makeup
  + Prevent disease progression through detection of at-risk siblings and unborn children
  + Foster inter-institutional and cross-departmental collaborations to combine expertise across Georgia Tech, Emory University, and Children's Healthcare of Atlanta
  + Coordinate regulatory and fiscal affairs required to gain approval for genomic profiling and on-and off-label interventions in keeping with initiatives at children's hospitals all over the country
  + Sharpen our focus on genomics-enabled precision medicine

Each center’s activities are supported through an NIH-funded leader, primary faculty membership, and a wide array of collaborators from Children’s, Emory, Morehouse School of Medicine, Georgia Institute of Technology and other area institutions.

Table

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**Figure 4: The Emory + Children's Pediatric Research Ecosystem**

### Pediatric Core Resources

The following Pediatric Research Alliance supported cores are designed specifically for child health researchers and are made readily available to pediatric researchers at a significantly reduced or fully subsidized cost offering access to instruments, technologies, services, and expert consultation to biomedical and behavioral investigators:

### Pediatric Core Resources

The following Pediatric Research Alliance supported cores are designed specifically for child health researchers and are made readily available to pediatric researchers at a significantly reduced or fully subsidized cost offering access to instruments, technologies, services, and expert consultation to biomedical and behavioral investigators:

* **The Pediatric-Winship Flow Cytometry Core** is 640 sq ft of dedicated space on the 3rd floor of the Health Sciences Research Building (E362), linked by a bridge to the Emory Children’s Center and in 200 sq ft in the Winship Cancer Institute (C5027). The Core consists of two dedicated cell sorter rooms capable of BSL2(+) level sorting and wet lab space housing the analysis instruments. The laboratories have ample bench space for sample handling and small equipment. Scheduling of instruments, training, and billing are done through PPMS, a campus-wide core management software package. The Core has a full-time technical director providing education, analysis, and cell sorting services and another 2.5 FTE providing immunology core services, cell sorting, experimental design, and clinical specimen processing. Analysis can be performed on five analyzers: a BD FACSymphony A5 [6UV 7V 5B 6GY 3R] and an identically configured A3, two 4 laser Cytek Auoras [405nm, 488nm, 561nm, and 640nm], two 5 laser Cytek Auoras [355nm, 405nm, 488nm, 561nm, and 640nm], and a BC Cytoflex S [4V 2B 4YG 3R].

Cell sorting can be performed on a SORP FACSAria II cell sorter [3UV 5V 2B 5YG 3R]. An Amnis ImageStreamX MkII cytometer also with 4 lasers (405nm, 488nm 561nm, and 642nm; 10 fluorescent channels) provides the capability for image cytometry. Analysis workstations are available for offline data analysis with multiple software packages including FACSDiva, FlowJo, FCSExpress, SpectroFlo, CytExpert and IDEAS.  Cytometry informatics packages are available in R or MATLAB. Data storage is available through campus-wide cloud services and data backup on a separate NAS. Immunology services include equipment and technical expertise for performing immunologic and diagnostic assays for infectious pathogens. Additionally, a new sorter from Cytek has just been purchased and will be offered to users with assistance.

* **The Pediatric Animal Physiology Core** is a centralized resource specializing in survival surgery for rats and mice in addition to assistance with other USDA-regulated animals such as rabbits, guinea pigs, and piglets. The Core Scientific Director assists all investigators with the development of IACUC protocols. The core currently offers surgical services include pulmonary banding in rat and neonatal rabbits, aortic banding, myocardial infarction, 5/6th nephrectomy for chronic kidney disease, liver-ischemia reperfusion, and ultrasound-guided injection ideally suited for targeted drug or cell therapy delivery.

The Core houses both a VisualSonics Vevo 3100 High-Frequency Ultrasound and a Vevo LAZR system. The Vevo 3100 allows high-resolution small animal ultrasound examinations for non-invasive measurement of in vivo structure and function. Users can also add the Vevo LAZR system to perform fast, non-invasive, real-time photoacoustic imaging. The Core Technical Director has been extensively trained in ultrasound techniques providing reliable and reproducible imaging data. The Core provides assisted and unassisted services, where investigators can reserve the equipment for their laboratory personnel use.

* **The Pediatric Biomarkers Core** facility provides the equipment and technical expertise to assay samples using methods that combine the features of gas-liquid chromatography and mass spectrometry. These core services are applicable to a wide variety of sample types and will allow small-molecule metabolite profile identification. The Core has a Thermo Scientific Vanquish UHPLC/TSQ Quantis triple quadrupole mass spectrometer, a Thermo Scientific Trace 1310 gas chromatograph/ISQ 7000 single quadrupole mass spectrometer, and three Waters High-Performance Liquid Chromatographs with fluorescence, UV, and electrochemical detectors. The Biomarkers Core currently analyzes oxidative stress biomarkers, including reduced and oxidized glutathione, cysteine, cystine, amino acids, polyunsaturated fatty acids (PUFAs), isoprostanes, hydroxynonenals, and malondialdehydes. This core also analyzes Fatty Acid Ethyl Esters (FAEE) from biological samples such as meconium, hair, placenta, blood, and plasma as markers of alcohol use and exposure. The Core is in the Emory-Children’s Center building.
* **Children’s Clinical and Translational Discovery Core (CTDC)** is a shared resource for Atlanta area child health researchers. The CTDC supports clinical trials with sample processing, shipping, and receiving correlative biology studies, and long-term biobanking of a wide variety of human tissues for future research. The lab contains six -80oC freezers and one -150oC freezer contained in a secure, key card-restricted, laboratory space. All freezers are under preventative maintenance contracts and monitored 24/7. The CTDC staff are notified in the event of temperature excursions and maintains access to backup storage units in the event of a catastrophic failure. Subsidized by Children’s Healthcare of Atlanta, the CTDC provides very competitive rates for biorepository studies. The CTDC can serve as the central biorepository for multicenter clinical studies. These services are offered to investigators conducting basic science, epidemiologic, translational, and clinical research related to improving child health.
* **The Pediatric Biostatistics Core** was established in 2009 with a mission to support pediatric researchers at Emory University and Children’s Healthcare of Atlanta. The high-rigor expertise provided by the core bolsters the quality of pediatric research to promote impactful and reproducible research findings across all child health disciplines. The Core provides in-house assistance and collaboration in study design, grant applications, protocol development, data analysis, publication preparation, and statistical education. In addition, the Core also provides access to expertise using qualitative research methods including aid in the design, collection, and analysis of data collected through qualitative methodologies and approaches such as focus groups, interviews, and observations.

The Biostatistics Core is one of the most productive pediatric biostatistics units in the country. Three PhD level and six master’s level biostatistics manage 400-500 active projects at any given time and collaborate on up to 100 grant applications and co-authoring 100-150 scientific articles every year.

* **The Pediatric General Equipment Core and Specimen Processing** is located within Emory-Children’s Center (ECC) and the Health Science Research Building (HSRB). It provides access to shared equipment to all Emory and Children’s affiliated investigators. Shared equipment includes ultracentrifuges, RT-PCR, gel documentation systems, TopCount system, developer, and specimen processing resources.
* **The Pediatrics Grant Editing/Manuscript Support (GEMS) Core** provides expertise to assist with the final editing of extramural grant applications and/or manuscripts reporting data generated from our pediatric research programs. Highly qualified grant consultants work one-on-one with fellows and junior faculty towards building a research track record and securing extramural funding.
* **The Pediatric Heart Diseases Data Registry Core** provides access to a rich registry of surgical, catheter-based, and electrophysiologic studies and interventions for multiple pediatric heart diseases. This core provides consultation assistance and can run queries, compile data, and conduct analyses for investigators wishing to perform outcome studies related to pediatric heart diseases. All requests will be subject to review/approval to ensure match with an outcomes research scope and to ensure all compliance requirements are met.
* **Cardiovascular Imaging Research Core (CIRC)** provides non-invasive imaging services for investigators involved in clinical research involving infants, children, and adolescents. The CIRC has dedicated space, equipment, and experienced staff to provide high quality cardiovascular imaging services as well as post-processing of previously acquired images using specialized software. These services include performance of a routine complete or limited congenital or non-congenital two-dimensional echocardiography, color and spectral Doppler imaging, advanced echocardiographic imaging including three-dimensional echocardiography, tissue Doppler imaging, strain and strain rate imaging, stress echocardiography and cardiac magnetic resonance imaging. CIRC has also launched a program for assessment of vascular health in pediatric patients that includes non-invasive assessment of endothelial function using brachial artery flow-mediated dilation, measurement of arterial stiffness using applanation tonometry and assessment of structural arterial changes using carotid imaging.
* **Medical Imaging Resources** provide a cross-disciplinary scientific, administrative, and educational home for imaging science through the Emory Center for Systems Imaging (CSI) and the Pediatric Imaging Research Core (PIRC) at Children’s Healthcare of Atlanta.

The Center for Systems Imaging Core (CSIC), one of the Emory Integrated Core Facilities (EICF), provides state-of-the-art research and pre-clinical human and animal imaging to the Emory community. The CSIC supports the Center for Systems Imaging (CSI), which is the cross-disciplinary scientific, administrative, and educational home for imaging science at Emory University. The goals of this center are to: (1) support the advancement of scientific research focused on the development of imaging biomarkers, (2) promote the development and application of biomedical imaging technology particularly magnetic resonance imaging, (3) provide core services for human and animal imaging studies, and (4) to build cross-cutting educational and training programs. The Center for Systems Imaging (CSI) is located at Wesley Woods and is focused on research projects and does not accommodate pediatric studies that require insurance billing, sedation, or increased clinical care.

* The Pediatric Imaging Research Core (PIRC) is an interdisciplinary research program that recognizes the importance of medical imaging in the diagnosis and treatment of diseases in children and young adults. PIRC provides investigators with modern imaging technology and collaboration with imaging experts to achieve research goals. Our team consults with investigators to enhance their research through access to state-of-the-art technology, pediatric radiologists, physicists, pediatric technologists, nurses, and pediatric sedation providers. PIRC also enables the conduct of standard imaging associated with large clinical trials. Services include MRI, CT, PET, bone densitometry, fluoroscopy, nuclear medicine, interventional radiology, ultrasound, X-ray, and pediatric sedation. The Pediatric Imaging Research Core (PIRC) is housed at Egleston Hospital and Scottish Rite Hospital and can accommodate projects that include insurance billing, sedation or increased clinical care.

### Emory Integrated Core Facilities Overview

The **Emory Integrated Core Facilities (EICF)** provide a number of facilities for use by all investigators in the state of Georgia.  Specific core services include cellular imaging and systems imaging, biostatistics and bioinformatics, electron microscopy, a personalized immunotherapy center, flow cytometry, genomics, proteomics, transgenic mouse and gene targeting, and rodent behavioral characterization.

### Formal Workshops and Seminars

Formal workshops and seminars facilitate networking and intellectual interactions between investigators. Some examples include:

* **Department of Pediatrics Grand Rounds (monthly):** Connects a clinical case from the hospital to a research presentation related to ongoing investigations and Emory and/or Children’s.
* **Pediatric Research Seminars (weekly):** A monthly seminar dedicated to topics of interest to the pediatric research centers.
* **Pediatric Research “K-Club” Meeting Series (monthly):** Sponsored by the Emory Departments of Pediatrics and Medicine and the GEORGIA CTSA, K-Club brings together young scientists with senior faculty who serve on study sections and who have extensive center for and grantsmanship expertise. Presentations may be attended in person or via a live web feed and are recorded for anytime viewing. In addition to the monthly program, attendees are offered the opportunity to meet individually with a professional grants educator/advisor for advice and direct feedback on their draft applications. K-Club topics span a wide scope and include a variety of specific sessions falling under the broad headings, such as the following:
  + Navigating the NIH and extramural research funding landscape
  + Strategies and approaches to writing NIH and other grant applications
  + General advice and guidance in preparing research grant applications
  + Research administration and logistics
  + Professional development including focused sessions on mentoring
* **Southeastern Pediatric Research Conference (annually):** Routinely attended by over 300 scientists from the southeast, this conference focuses on child health research.
* **FEED Conference (annually):** Co-sponsored by the Emory Departments of Pediatrics and Medicine, the Faculty Education, Enrichment, and Development Conference or “FEED Conference” is an annual full day event that includes general presentations as well as career-path specific sessions for clinical researchers and basic scientists. Regularly presented topics disseminate practical information such as use of tools to facilitate collaboration, finding research funding, the manuscript review process and the Emory promotion process.
* **FAALI (Faculty Academic Advancement, Leadership, and Inclusion) Lecture Series**, presented throughout the year by senior faculty within the School of Medicine, covers practical topics aimed at assisting faculty in their career development.
* **Clinical Research Bootcamp (annually):** The Emory School of Medicine Office of Faculty Development organizes and hosts an annual “Clinical Research Boot Camp,” a day-long program providing participants with a comprehensive overview of the major components involved in clinical research, including the development of sound research protocols, maintaining compliance and high ethical standards, and the successful planning of a productive research career. Specific topics addressed include study design, statistical resources and basic statistical techniques, securing research funding, Institutional Review Board considerations, conflict of interest and the importance of networking.
* **Junior Faculty Development Course (10 sessions over 5 months):** Featuring a diverse faculty selected from throughout the School of Medicine, School of Public Health and Goizueta Business School, this course presents information necessary for success in an academic medical center using a variety of formats including didactic presentations, panel discussions, group and individual exercises, and case-based problem solving. Specific topics include organizational structure and finances, teaching, presentation skills, promotions and tenure, manuscript writing, negotiation and conflict resolution and ethics.
* **Emory Medicine Professional Leadership Enrichment and Development Program (EM-ProLEAD):** The focus of EM-ProLEAD is to enrich leadership skills, enhance business knowledge, and develop strong partnerships across Emory. Aspiring leaders must be nominated by their division chiefs to be considered. The Program features lessons from campus leaders, more advanced training in financial planning and strategy, and exercises to develop recognition of individual strengths and areas for growth. The program is 10 months in length and includes mandatory 4 hour monthly sessions.
* **Laboratory Management Course:** Once a year, the Emory Office of Postdoctoral Education offers a Laboratory Management training class to support the success of postdocs and junior faculty in establishing and managing their own independent basic science research labs. The course has five two-hour sessions with two major topics covered in each session in one-hour segments. Topics that are covered include setting up your own lab, budget management, hiring people, data management and managing the tenure-process.  The course is offered once a year in the Spring semester. A certificate of “Lab Management Training” is awarded to all who attend all 5 sessions and complete a final course project.

**The Rollins School of Public Health also offers:**

* Extensive spectrum of courses including epidemiology, biostatistics, and data management in research are available to Emory faculty and through the MSCR program
* Regularly scheduled seminars in epidemiology, biostatistics, and clinical trials methodologies
* MSCR Journal Club: Critical assessment of research design and methodologies; discussion of patient-oriented research related topics (e.g. use of placebo; informed consent)
* MSCR Clinical Research Colloquium: Series of seminars given by leaders in clinical investigation detailing their clinical investigation careers and how they have organized multidisciplinary approaches to address complex issues in biomedical research

### Grant and Manuscript Writing Resources

Numerous institutionally initiated and supported faculty development opportunities are available throughout Emory University:

* **The Pediatrics Grant Editing/Manuscript Support Core (GEMS**) provides expertise to assist with final editing and of extramural grant applications and/or manuscripts reporting data generated from our pediatric research programs. Highly qualified grant consultants work one-on-one with fellows and junior faculty towards building a research track record and securing extramural funding.
* **Proposal Development Assistance** for large grants is provided through the Office of Research with a range of services available.
* The Emory University Center for Faculty Development and Excellence organizes a faculty writing group called **“The Writing Room”** that is tailored to a small group of participants and designed to meet their specific needs and preferences. The Center for Faculty Development and Excellence serves as scheduler and convener of this group and facilitates the planning and communication of the current cohort of participants.
* The Emory School of Medicine Office of Faculty Development offers **a “Peer-Mentoring Manuscript Development Initiative,”** connecting junior faculty ready to publish with experienced faculty who can provide the needed guidance and mentoring.
* The Laney Graduate School at Emory University organizes the **“Grant Writing Program”** that addresses every stage of grant proposal writing inducing developing fundable project ideas, presenting projects in persuasive ways and tailoring proposals to specific funders. The program is designed so that you can participate in a series of forums and workshops that build on one another and help you to develop your proposal and dissertation project. Workshops and informational sessions are offered throughout the year.
* The Woodruff Health Sciences Library subscribes to **Nature Masterclasses**, an online scientific writing course. The masterclass consists of 15 course modules, varying in length from 30 to 75 minutes each, covering the entire scientific publishing process, from planning a paper to getting it published. The modules are taught by editors from the Nature journals and cover topics ranging from "Elements of Writing Style" to "Selecting a Journal for Publication" to "Measuring Impact."

### Pilot/Seed Grants

The Emory University Department of Pediatrics and Children’s Healthcare of Atlanta are committed to providing grant support for investigators as they pursue extramural grant funding. Annual seed grant programs available for research initiatives include:

* Pediatric Research Center Pilot Grants, which support basic, clinical and translational pediatric research projects with an emphasis on supporting junior faculty, developing collaborations among faculty, and providing seed funding for large center grants
* Emory University also offers a variety of seed funding opportunities open to all Emory faculty, such as the Emory University Research Committee (URC) awards. Through collaboration with the Emory University Research Committee, the GEORGIA CTSA supports several health-science specific $30K awards for short-term research goals that can be accomplished in one year or less. The program prioritizes funding of research and creative projects to explore new areas of research that are likely to attract outside support.
* The Children’s Healthcare of Atlanta Pediatric Technology Center at Georgia Tech offers several child health focused seed funding opportunities:
* The Imlay Innovation Fund supports collaborative activities and pediatric innovation and discovery efforts between the two institutions, focusing on practical steps that will lead to clinical impact and potential commercial opportunities.
* The “Quick Wins” funding program pairs Children's clinicians with Georgia Tech engineers and computer scientists to deliver rapid solutions to address unmet clinical needs. Projects must propose delivery of a workable solution into the hands of a clinician within 18 months from the receipt of funds and project start.

The Georgia CTSA offers targeted seed grant programs to promote clinical and translational science including support for research involving community-based research initiatives and development and support of research technologies aimed at benefitting the clinical community.

### Mentoring

Mentoring is a strong cultural component at all levels of Emory. The “Mentor Emory” program is organized annually and not only pairs mentees with seasoned mentors based on the mentee identified needs, but also facilitates the development of these relationships through moderated sessions and suggested communication strategies. The Department of Pediatrics also offers a variety of mentor-specific resources including guidelines for division mentoring programs, mentoring worksheets and assessment tools, and suggested topics for discussion. Additionally, mentor training is supported by the new Department of Pediatrics initiative, Child Health Initiative to reduce the Physician Scientist Shortage (CHIRPPS), which aims to provide support in a variety of areas applicable to assisting Child Health Physician Scientists along the entire pathway.

### The Emory Office of Postdoctoral Education (OPE)

***The Emory University Office of Postdoctoral Education (OPE)*** has been the home for the formation and enforcement of Postdoc policies since 1999. Although established to oversee and serve the needs of the nearly 700 PhD postdoctoral fellows working across the entire Emory University Campus, OPE programs and resources are available to everyone at Emory.

OPE Coursework: Working with faculty, OPE directs courses specifically designed for Postdocs, Junior Faculty and medical research fellows and addresses the requirements outlined for mentored trainees funded by NIH.  These courses address the following areas: Responsible Conduct of Research; Laboratory Management; and Rigor and Reproducibility.

OPE Career Development Programs and Services: OPE provides tools for IDP’s and develops and offers workshops and programs throughout the year for grant writing and other research relevant career development activities, including but not limited to:

* CV, resumes, and cover letter writing
* Special Science Writing for Publication
* Professional development
* Writing teaching and research statements
* Special Grant Writing Workshops and grant editing for F, K and private funding sources

OPE Sponsored Courses/Workshops - Additional Details:

**The Responsible Conduct of Research Ethics course** is offered twice each year and is specifically designed for PhD and MD trainees conducting basic, translational and clinical research. Using a case study and faculty-led approach, discussions on conflict of interest, authorship, research misconduct, data acquisition and management, collaborative and team science, human subjects, animal use, and mentor/mentee relationships provide a broad appreciation for the ethical issues of research. A separate two-hour workshop on Rigor and Reproducibility is offered twice each year.

**F and K grant writing tutorial series** are offered six times a year for trainees preparing federal and private grant applications. Focused on F32 and K award scholarships, each series is composed of three didactic sessions followed by individual revising sessions guided by a grants writer working with the Postdoctoral Fellows, Medical Research Fellows, or junior faculty. They have a proven track record with a success rate of funding upwards of 50% for applications submitted from postdoctoral fellows and junior faculty. Over 90% of Postdoctoral Fellows who receive K career development awards move to tenure-track faculty positions.

**The F32 Bootcamp** is a 12-week series designed to help the Postdoctoral Fellow and their sponsor develop a mature and well-reviewed application. Each session addresses the specifics of a particular grant section and strategies that strengthen or weaken that section. Webinars are also created for each section so that attendees can re-review the material as they write their own section. A grant editor reviews each section and provides appropriate feedback, guidance, and editing.

**The Leadership and Management Certificate Program** is comprised of nine workshops and is designed to encourage the development of other professional skills. These sessions are taught by the Emory University Goizueta Business School faculty and cover essential topics in executive education. The skills covered are designed to help Postdoctoral Fellows become better leaders and managers whether they are planning on running an academic laboratory or are moving to a corporate or non-profit environment.

### The Laney Graduate School - Graduate Division of Biological and Biomedical Sciences

**The Laney Graduate School and the Graduate Division of Biological and Biomedical Sciences**

The Laney Graduate School is home to over 40 PhD Programs spanning the natural sciences, social sciences, and humanities.  Most students working in biomedical fields are in programs based in the Graduate Division of Biological and Biomedical Sciences (GDBBS), a division of the graduate school that includes eight interdisciplinary, interdepartmental graduate programs. These programs include:

* Biochemistry, Cell, and Developmental Biology
* Cancer Biology
* Genetics and Molecular Biology
* Immunology and Molecular Pathogenesis
* Microbiology and Molecular Genetics
* Molecular and Systems Pharmacology
* Neuroscience
* Population Biology, Ecology, and Evolution

Around 400 PhD students receive their training in the labs of over 340 faculty members who are located across all of the major academic units on campus. Students also have the opportunity to work with faculty members at Emory National Primate Research Center, the U.S. Centers for Disease Control and Prevention, and the Veterans Administration Medical Center. Students are enrolled in a specific program that fits their broad interests. Due to the interdepartmental nature of the programs in the GDBBS students work with faculty from many different departments, which provides a truly interdisciplinary training experience. The programs offer a well-defined course of study, a small cohort of entering students in each program, and a community of faculty who are all invested in the success of each student.

Institutional support for graduate education at Emory is very strong. Successful applicants enrolling in GDBBS Programs receive 21 months of full support from institutional funds and are supported by research grants, training grants, or other individual fellowships for the remainder of their training. Several of the Programs are affiliated with a pre-doctoral training grant, typically from the National Institutes of Health.

The School of Medicine’s MD/PhD Program provides the opportunity for exceptionally bright and dedicated students to acquire both clinical and basic research training in order to pursue challenging careers in academic medicine. The Program is designed to provide students with the in-depth, high-caliber research training and medical education required of future leaders in biomedical research. Students are enrolled in both the Laney Graduate School and the School of Medicine during the approximately seven years required to complete both degrees in the Program. Many MD/PhD students select a Program within the GDBBS for the PhD component of their degree. The MD/PhD Program is funded in part through the National Institutes of Health’s Medical Scientist Training program. Additional support derives from Emory University, the School of Medicine, and the Laney Graduate School.

Students in GDBBS Programs receive training in critical thinking, creative problem solving, effective communication, and technical skills relevant to their field, all in preparation for successful careers in academic or nonacademic venues. Some GDBBS students continue their training as postdoctoral fellows at top research institutions around the world. Other students choose positions in industry, scientific communication, public policy, commercialization, education and outreach, nonacademic lab science, and more.  Professional development and career planning activities help enable students to make informed decisions for their career path and help to prepare them for the career of their choice.