FACILITIES AND OTHER RESOURCES
INCLUDE THE SECTIONS MOST RELEVANT TO YOUR APPLICATION AND OMIT ALL OTHERS

Milken Institute School of Public Health
The George Washington University
Washington, DC

ENVIRONMENT:
The George Washington University (GW) was created in 1821 through an Act of Congress, fulfilling George Washington's vision of an institution in the nation's capital. The largest higher education institution in the District of Columbia, GW consists of three campuses (Foggy Bottom and Mount Vernon in Washington, DC, and the Virginia Science and Technology Campus in Ashburn, Virginia) and several graduate education centers in the DC metropolitan area and Hampton Roads, Virginia. The University is one of the nation's leading academic institutions with chartered centers and institutes that provide research and innovation in science and technology, health, public policy, global security, and the arts and humanities. Research expenditures from federal sources, a key measure of an institution's research activity, increased from approximately $92 million in fiscal year 2006 to $162 million in fiscal year 2016.

The Office of the Vice President for Research (OVPR) promotes high standards of ethical research and scholarly conduct, and provides activities that lead to extramural funding. The OVPR Research Enhancement Unit (REU) builds collaborative interdisciplinary research teams through assistance with proposal development for large multi-investigator program projects and center grants, and develops research infrastructure by facilitating dialogue among investigators across disciplines. Educational development seminars and workshops for early stage investigators are available through the REU. Within OVPR, units are dedicated to working collaboratively with principal investigators (PIs) to ensure research integrity and compliance in order to comply with federal, state, local laws, regulations, and university policies for or on behalf of GW.

The School of Public Health and Health Services was established in 1997, and renamed the Milken Institute School of Public Health (SPH) in 2009. The SPH attracts top scholars and is a catalyst for the study and advancement of a wide spectrum of community, social, and scientific public health initiatives. Within SPH, research is coordinated by the Office of Research Excellence (ORE) which is headed by a Senior Associate Dean for Research (SADR). ORE consists of 5 functional Units; Pre-Award, Research Integrity, Compliance and Ethics (RICE); Post-Award; Research Metrics; and Administration Support. The various Units that are headed by specialists, are responsible for supporting Departmental administrators as well as Investigators through the various processes and stages of research. Under SPH, various research centers and programs focus on key areas of domestic and global health, including the Sumner M. Redstone Global Center for Prevention and Wellness, the Center for Health Policy Research, the Health Workforce Research Institute, the Jacobs Institute for Women's Health, the Geiger Gibson Program in Community Health, the Hirsh Health Law Program and the Global Health Security Program. As a multi and transdisciplinary institution, cross-school collaborations are ongoing within all six academic departments of SPH, which include Environmental and Occupational Health, Epidemiology and Biostatistics, Exercise and Nutrition Sciences, Global Health, Health Policy and Management, and Prevention and Community Health. The multidisciplinary ethic of the school extends to the rest of the campus, as embodied by numerous collaborations with colleagues in GW's medical, nursing, public policy, law and business schools. The public health programs of SPH have full accreditation from the Council on Education for Public Health (CEPH). Additionally, SPH is housed in a Leadership in Energy and Environmental Design (LEED) platinum-certified building. The building features more than 115,000 square feet of floor space consisting of classrooms, research labs, departmental offices, and conference rooms.

Major areas of research in the Department of Environmental and Occupational Health include antimicrobial resistance, chemical exposures and their health impacts, air pollution, climate change, sustainable energy, worker health, and risk and decision sciences. The Department’s geographic focus is from the greater Washington, DC, metropolitan area to Asia, Africa, Europe and Latin America. Department faculty have
received research funding from numerous agencies, including National Institute of Environmental Health Sciences, National Cancer Institute, National Institute of Allergy and Infectious Diseases, National Science Foundation, NASA, Pew Charitable Trusts, U.S. Center for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health, U.S. Army Medical Research, the Construction Safety and Training Center (CPWR), the Canadian Institutes of Health, the Children’s Investment Fund Foundation, and the Rockefeller Foundation. Faculty serve on various federal boards and advisory panels, including for the National Institutes of Health (NIH), CDC, and the National Academies of Sciences, Medicine, and Engineering. The Department is home to the Antibiotic Resistance Action Center (ARAC) and is the convening center for the DC Area Colleges and Universities Environmental and Occupational Health Consortium.

The **Department of Epidemiology and Biostatistics** supports a robust and highly diverse portfolio of research projects in the quantitative and laboratory sciences of public health. Department faculty are engaged in infectious and non-communicable research that ranges from the molecular to the computational to population-based surveillance to cohort studies to randomized clinical trials. Faculty from the Department lead several important research entities within the SPH including the world-renowned GW Biostatistics Center (BSC), the DC Center for AIDS Research (DC CFAR), the HIV Prevention Trials Network GW Clinical Research Site (HPTN CRS), the DC Cohort, the DC site of National HIV Behavioral Surveillance (NHBS), the Computational Biology Institute (CBI) and the Biostatistics and Epidemiology Consulting Service (BECS). The primary source of funding is from the NIH and other funding sources include CDC, U.S. Agency for International Development (USAID), District of Columbia Department of Health, EGPAF and AHRQ.

The **Department of Exercise and Nutrition Sciences** conducts nutrition and physical activity research that spans the basic and clinical sciences to applied community-based research to epidemiological analyses of large national and international surveillance studies. Focus areas include: diet and physical activity for chronic disease prevention, school- and community-based physical activity and dietary interventions, metabolic and health effects of artificial sweeteners, dietary assessment in diverse populations, aging and physical function, obesity prevention, food access and sustainable food systems, injury prevention and muscular adaptation to exercise. Department faculty have projects funded by multiple entities, including the NIH, the U.S. Department of Agriculture, the American Heart Association, and local and national charitable foundations.

Areas of research expertise within the **Department of Global Health** include maternal, newborn, and child health, malnutrition, infectious disease, chronic disease, environmental health, health diplomacy and governance of international health systems, demography, health systems analysis, global health economics, program evaluation, humanitarian emergencies, and global health communication. Faculty in the Department hold a diverse portfolio of research and technical assistance from numerous agencies, including the NIH, the National Science Foundation, USAID, and the Bill and Melinda Gates Foundation.

The **Department of Health Policy and Management** conducts innovative and rigorous multidisciplinary research to address significant health challenges that are also pertinent to ongoing policy and management issues confronting the nation and the world. Leveraging our unique location in Washington, DC, Department faculty are often invited to work with and advise federal agencies, Congress, and the White House on public health issues. The Department has been rated as one of the top ten academic health policy units in the nation, according to the *U.S. News and World Report*. Our faculty also provide strategic and technical advice to clients to help them understand the evolving world of public health and health policy. Our major research activities include providing policymakers, public health officials, health care administrators and advocates, and the public with the information and ideas they need to improve access to high quality affordable health care and population health. The primary source of funding is from numerous agencies, including NIH, CDC, Agency for Healthcare Research and Quality, Patient-Centered Outcomes Research Institute, Centers for Medicare & Medicaid Services, Health Resources and Services Administration, The Atlantic Philanthropies, Robert Wood Johnson Foundation, Commonwealth Fund, District of Columbia Department of Health, W.K. Kellogg Foundation, Kresge Foundation, American Heart Association, and the Henry J. Kaiser Family Foundation.

The **Department of Prevention and Community Health** conducts research to develop, implement, and evaluate innovative and theoretically-based interventions to promote health and well-being. Faculty in the Department hold a diverse portfolio of research from numerous funding agencies, including NIH, CDC, the Bill and Melinda Gates Foundation, American Heart Association, Robert Wood Johnson Foundation, Children’s
Investment Fund Foundation, UNICEF, USAID, and State governments. Current initiatives at the Department include the Center for Health and Health Care in Schools, the Center for Social Well-Being and Development, and the Sumner M. Redstone Global Center for Prevention and Wellness. The faculty in the Department work in the United States as well as various countries in Asia, Africa, South America, and Europe.

**Institutional Commitment to Investigators: Resources for Career Development**

- The OVPR provides faculty with guidance and training to successfully apply for research grant funding. Research salons are designed to connect and engage GW faculty from diverse disciplines in collaborative intellectual and scholarly exchange around research-themed issues, questions and challenges. Pre-award grant development Boot Camp is one of those offerings presented twice annually. Under OVPR leadership and in tandem with the schools’ Associate Deans for Research, OVPR’s Research Enhancement provides faculty with guidance and training to successfully apply for research grant funding. Regular or research faculty and research scientists eligible to serve as PI and their graduate students may request services from Research Enhancement.

- **The Clinical and Translational Science Institute at Children’s National (CTSI-CN):** The CTSI-CN is a partnership between Children’s National Medical Center and GW to accelerate the translation of research and dialogue into improved child, family, and community health by fostering collaborative investigations.

CTSI-CN provides members with access to:

- Education opportunities such as career development support, training opportunities, seminars, and symposia;
- Research resources that include free consultations for CTSI-CN services, reduced rates for NIH-sponsored and pilot research support, and letters of support for grant applications;
- Collaboration opportunities to participate in interdisciplinary research and exposure to national opportunities available through CTSA institutions;
- Funding for pilot award recipients and KL2 Scholars;
- Membership in the Society for Clinical and Translational Science; and
- Information about current research, upcoming events, and grant opportunities through weekly e-digests and quarterly newsletters.

**Student Research in School of Public Health**

In order to ensure that SPH students are able to respond to the heath needs of the various environments under which they serve upon successful completion of their GW studies, SPH supports and encourages undergraduate and graduate student research projects involving human subjects. The School provides numerous opportunities within the curriculum for students to take undertake research in fulfillment of their academic requirements. These include dissertation (e.g., honors and masters’ projects), MPH culminating experience (CE), MPH practicum, biostatistics consulting practicum, field lab experience, independent study, internships and classroom requirements. Some of SPH students have the opportunity to work with Principal Investigators (PIs) for a semester and be actively involved in planning experiments, collection and analysis of data, or performing literature reviews. These experiences are designed to increase student exposure to research and encourage enrollment in PhD programs. Much of student involvement can result in student abstract submissions plus authorship on peer-reviewed publications. The SPH provides financial support for meritorious research conducted by students using various mechanisms including dissertation awards. Student research achievements are recognized within SPH and across the University in various ways including participation in an annual GW wide Research Days event. The SPH takes pride in its effectiveness in training undergraduate and graduate students through high-quality research opportunities, rigorous standards, and individual responsibility. The SPH continues its long-held tradition and commitment to student preparation leading to careers in public health through meritorious research, allowing them to continue to make meaningful contributions to the public health field.

**International Services Office (ISO):** The ISO provides resources to assist with transition to the U.S. as well as GW. ISO Advisors host a variety of special events that highlight the diverse international student population. Resources such as calling home, housing, safety, transportation, health and wellness, and other miscellaneous items are available including visa and tax information plus advisement.

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Student health services are available from the Colonial Health Center (CHC) at GW and is a multidisciplinary, integrated, student healthcare service that provides confidential, student centered care in an accessible, safe, culturally sensitive, and supportive environment.

The Center for Student Engagement at GW enhance all aspects of the student experience by fostering communities that promote learning and development to prepare students to make positive contributions in the world. Recognizing that GW is a community of scholars, the Center for Student Engagement brings learning out of the classroom and works to implement innovative four-year, competency-based student learning outcomes that are personalized to ensure students achieve their unique goals and aspirations. Coordinated services include the Office of Alumni Relations which serves the more than 225,000 alumni living in 150 countries around the globe and furthers three main goals: enabling lifetime engagement, gathering a voice for alumni, and building a culture of philanthropy. Center for Civic Engagement and Public Service aims to integrate civic engagement into GW's educational work. The Center focuses GW's resources to meet community needs beyond the campus; promotes active citizenship in a diverse democracy; and enhances teaching, learning, and scholarship at GW. Disability Support Services (DSS) is committed to insuring all students with disabilities have equal access to educational opportunities. DSS also serves as consultants to others who may suspect their participation in an academic program is being compromised by a disability. The Multicultural Student Services Center (MSSC) has developed strategies for student success through diversity education, programs, and services. MSSC emphasizes the importance of providing learning, reflecting, and connecting spaces for students around gender, race, culture, sexual orientation, spirituality, and socio-economic status. GW has valuable technology services for students. These are an important component of a successful academic and social experience at the University. High-speed Internet connections in the residence halls and convenient indoor and outdoor wireless hot spots (GWWireless) give GW students access to many online resources. Through GWMail, which uses a Google Mail interface, students have six gigabytes of storage space. For extensive technology support, The Division of Information Technology offers convenient walk-in and hotline hours for students.

L laboratory
GW maintains basic and applied research science labs at both the Foggy Bottom and the Virginia Science and Technology campuses.

The Science and Engineering Hall (SEH) meets the needs of the GW's growing research portfolio, serving as a hub for discovery and providing opportunities for cross-disciplinary collaboration. The building includes functions from the SPH, the School of Medicine and Health Sciences Cancer Center, the School of Engineering and Applied Science, as well as the Columbian College of Arts and Sciences' physical science departments. The SPH's seventh floor in SEH contains 15,260 square feet of lab space, a 1,700 square foot teaching lab, 3 conference rooms, 86 cubicles for lab researchers, and 26 faculty offices. The SEH building is designed with shared common areas outside all labs, banks of workstations, and a spiral staircase that links the public health floor with the medical floor to allow for workflow between both schools. The SPH labs support diverse research projects in the school including virology, bacteriology, environmental and occupational health, analytical chemistry, and toxicology. Both the Computational Biology Institute (CBI) and the Antibiotic Resistance Action Center (ARAC) are located in the SEH. In addition to specialized equipment within the large labs, there is a 1,200 square foot BSL-3 laboratory and a DNA sequencing core.

The Exercise and Nutrition Sciences department has two fitness testing facilities, the Clinical Exercise Physiology Laboratory (CEPL) located in Washington, DC, on the Foggy Bottom campus (DC Lab) and the Exercise Physiology Laboratory (EPL) located in Ashburn, Virginia, on the Virginia Science and Technology Campus (VTSC Lab). Both labs offer exercise and clinical equipment for body composition, weight-loss and fitness testing. The CEPL includes the Anatomy and Physiology Laboratory, the Body Composition Laboratory, the Exercise Physiology Laboratory, the Biochemistry Laboratory, and the Prevention, Care, Assessment & Treatment Laboratory. It is the primary teaching space, hosting all undergraduate and graduate level academic labs. The CEPL also is home to various research studies conducted within the Exercise & Nutrition Sciences Department, as well as through various other departments in the School of Public Health. In addition to academics and research, the CEPL is used to conduct public testing for the DC Metro area, in which individuals from the community are able to receive body composition, resting metabolic rate, and aerobic and

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anaerobic testing. The Weight Management and Human Performance Laboratory at GW is located on the Virginia Science and Technology Campus and is used for providing weight management programs plus human performance testing to members of the DC metro community.

CORE & SHARED FACILITIES

The **Antibiotic Resistance Action Center (ARAC)** at the SPH was created to preserve the effectiveness of antibiotics by engaging in research, advocacy, and science-based policy. ARAC is focused on finding solutions to antibiotic resistance. The ARAC pairs original research with strategic communication and policy strategies to advance solutions to combat antibiotic resistance. Sourced: http://battlesuperbugs.com/about/about-arac

The **Biostatistics Center** is a research center within the SPH. The Center serves as the coordinating center for large scale multi-center clinical trials and epidemiologic studies. Established in 1972, the Center participates in major medical research programs of national and international scope, frequently leading to major medical advances. Most of the over 65 major research projects undertaken by the Center have been under the auspices of National Institutes of Health (NIH) and other federal agencies. Center faculty and staff have published over 227 articles related to statistical methodology, clinical trials or epidemiologic methods, over 805 articles presenting the results of medical investigations, and several books. The Biostatistics Center is staffed by over 100 employees including many masters and doctoral level statisticians and computer systems analysts. The staff has extensive experience and expertise in biostatistics, epidemiology, clinical trial study design and data management, and administration and coordination of multi-center research studies. Sourced: http://www.bsc.gwu.edu/bsc/index.php

The **Biostatistics and Epidemiology Consulting Service (BECS)** is a service embedded in the SPH Department of Epidemiology and Biostatistics and provides biostatistical, epidemiological, and study design support for health-related research projects. The BECS addresses statistical needs of small- to medium-sized observational, epidemiological, and laboratory studies as well as small clinical trials. Priority services of the BECS are: pre-award consultation on best practices for biostatistical methods, sample size selection, and study design for health-related grant proposals, and pre-award statistical analysis assistance (by faculty and/or graduate students in biostatistics and epidemiology) of preliminary data to support a grant application. The BECS offers BECS Quick Clinic which is a free resource for GW-based faculty, medical residents, fellows, and staff working with GW faculty to handle health-related statistical and data management inquiries with quick turnaround.

The **Computational Biology Institute (CBI)**, founded in 2012, brings together leading faculty in computing, health, engineering, and biology to harness vast and diverse information, opening new doors of discovery that have the potential to benefit millions of people. The CBI is also maximizing the University’s unique relationships in the nation’s capital to form research partnerships and spotlight cutting-edge topics that may influence future U.S. and international policymaking. By blending its own skills with the expertise of engineers, mathematicians, statisticians, clinicians and others, the CBI is contributing to knowledge and resources for use by researchers on a global scale, influencing how the world uses science and technology to solve its most pressing problems. With these truly incomparable resources and expertise, the CBI performs cutting-edge research and helps raise awareness of scientific advancements that improve our health, environment and overall quality of life. The CBI has developed a 5,000 square foot collaborative research space for interdisciplinary interactions and sharing of ideas complete with state-of-the-art technology to facilitate such collaborations. The space houses faculty, postdocs, research associates, visiting faculty, graduate students, and undergraduate researchers. The CBI has a full-time Assistant Director to support the activities of the institute. Additionally, the GW Division of Information Technology staffs the CBI with a full-time HPC expert in genomics applications and this staff member is located in the CBI.

**Sequencing Core Facility**

The GW SPH Next Gen Sequencing (NGS) Core provides Illumina high-throughput sequencing on the MiSeq and NextSeq instruments. Additional sequencing-related services to be offered by the Core will include: initial consultation, library preparation and validation, sample QC, sequencing, data retrieval and processing. NGS applications include DNA Seq (Whole genome sequencing, exome capture and ChIP sequencing) as well as RNA Seq (Whole transcriptome with rRNA depletion and Transcriptome sequencing with polyA pull down).

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The Genomics Core at GW provides a variety of genomics services to the research community, from Library preparation to Next Generation Sequencing. Led by SPH, and in partnership with the Informatics Core and the Bioinformatics Unit, both part of the Clinical and Translational Science Institute at Children's National (CTSI-CN). The core is equipped with a NextSeq 500, MiSeq, Qubit and a Bioanalyzer.

GW Genomics conducts Nucleic Acid extraction, Library preparation, Quality Control, Next Generation Sequencing, Amplicon amplification, Covaris shearing, among other services. Through their partnership with the Informatics Core of the CTSI-CN, they also conduct bioinformatics analyses and consultations.

Nanofabrication and Imaging Center
The GW Nanofabrication and Imaging Center (GWNIC) is centrally located on GW's Foggy Bottom campus. GWNIC equipment and services are open to the GW community and external users. The GWNIC Nanofabrication Suite features equipment for lithography, deposition, etching, thermal processes, measurement and characterization. The Nanofabrication Suite in Science and Engineering Hall has approximately 5,000 square foot of Class 100 cleanroom, approximately 4,000 square foot microscopy suite, slab-on-grade construction to minimize vibrations, and passive and active shielding to prevent electromagnetic interference. The GWNIC Imaging Suites provide university-wide core resources for acquisition and analysis of microscopic images and data. Together, the suites feature light microscopy, confocal microscopy, transmission electron microscopy (TEM), scanning electron microscopy (SEM), focused ion beam scanning electron microscopy (FIBSEM) and infrastructure for preparation of microscopy samples utilizing the latest and most precise sectioning tools. The Imaging Suite at the Science and Engineering Hall is approximately 4,000 square foot, it adjoins an approximately 5,000 square foot Class 100 cleanroom, it features a slab-on-grade construction to minimize vibrations and has passive and active shielding to prevent electromagnetic interference. The Imaging Suite in Ross Hall is approximately 1,500 square foot and features lab bench space, biosafety hood, a microsurgery lab, a Vibratome for sectioning and a cell culture incubator.

Flow Cytometry Core Facility
The mission of GW School of Medicine and Health Sciences (SMHS) Flow Cytometry Core Facility is to provide researchers access to well characterized cytometry equipment for sophisticated cell sorting and cell analysis experiments, as well as services in data analysis, instrument training and cytometry education. Our goal is to facilitate the production of accurate, reproducible cytometry data in support of the academic and research mission of the GW scientific community.

The core facility is open to all schools and departments of the GW community, as well as to researchers from external academic, industrial, and governmental institutes. The facility provides high quality services in cell sorting and analysis, data analysis, and instrument and software training. The facility maintains 2 cytometers and a workstation for data analysis. The Cell Sorter is a 4-laser, 15-color BD influ high speed sorter and its features include a small particle detector, 4 nozzle size options-optimal for sorting a wide range of cell and particle sizes, up to 6-way sorting and a plate with Index sorting. The Cell Analyzer is a 3-laser, 12 color BD Celesta analyzer and its features include an Automated Qc and a High Throughput Sampler (HTS) compatible with 96-well and 384-well microtiter plate.

The facility has two options for data analysis. The first is a site license for FlowJo which provides the convenience of data analysis from lab/personal computers. GW flow core users are allowed one registered computer per PI/lab at no charge. The second is the PC analysis workstation is available free of charge. The software and analysis tools available are FlowJo analysis software, current Protocols in Cytometry Wiley access, Flow Cytometry Education Material: Excyte access, Microsoft Word, Excel, PowerPoint and Adobe Acrobat Pro.

Bioinformatics Unit at Children's National
The Genomics Core partners with the Bioinformatics Unit through the Clinical and Translational Science Institute at Children's National. The CTSI-CN CRI Bioinformatics Unit (CBU) provides bioinformatics consultation and analytical services in an initiative sponsored by The Center for Genetic Medicine Research, the Center for Translational Science, the Clinical and Translational Institute at Children’s National (CTSI-CN), the District of Columbia.
Intellectual and Developmental Disabilities Research Center (DC-IDDRC) and the Chief Research Officer’s office. The CBU works closely with researchers to design and structure their studies with the applicable bioinformatics support from the very beginning of a project. CBU assist in the following types of Study Consultation and Experimental Design: mRNA/miRNA Sequencing, Exome Sequencing, Whole Genome Sequencing, Microarray, Metagenomics/Microbiome Sequencing, ChIP Sequencing, Single Cell Sequencing and other customized sequencing. The CBU performs genomic data analysis with standard as well as custom pipelines according to specific requirements of a project. CBU also actively participates in training the next generation of biomedical researchers with the goal of enabling quality research and education. The bioinformatics Data Analysis services provided by CBU are De Novo Assembly, Single Nucleotide Variation Detection, Copy Number Variation, Structural Variant Detection, Fusion Analysis, Differential Gene Expression, Pathway Analysis and other customized analysis.

The Office of Laboratory Safety (OLS) is a service organization within OVPR responsible for regulatory and compliance oversight of the all research conducted in GW that involve biological materials, radiation and lasers. The OLS assists in protecting faculty, staff, students, the community and the environment by addressing the safe handling and containment of infectious microorganisms and hazardous biological materials, lasers and radioactive materials. The OLS is in charge of the Institutional Biosafety Committee (IBC) and the Radiation Safety Committee (RSC). The IBC is responsible for reviewing projects that involve, but are not limited to, recombinant DNA, RNAi, Dual Use Research (DURC), genetically modified microorganisms, plants and animals, artificial gene transfer, pathogens, biologically derived toxins, human materials and nanomaterials in accordance with the NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules. The RSC is responsible for reviewing research that involves radioactive materials (RAM) and radiation producing equipment in compliance with the Nuclear Regulatory Commission (NRC) who provides institutions with licenses to work with RAM. The Laser safety program is designed to comply with the American National Standard for Safe Use of Lasers (ANSI Z136.1). The OLS works closely with GWPD, The Office of Health & Safety, Facilities Management and the Office of Risk Management.

CLINICAL: SUGGESTED GUIDANCE FROM NSF AND NIH - please remove this section before submitting: In this section provide a description of the access to the quantity and quality of clinical material that will be needed to complete the study. Description of relevant physical facilities that should be included and complementary clinical programs and/or investigators. If your proposal is one that will require patients or patient-derived materials, include sufficient documentation concerning the access to the quantity and quality of subjects/clinical material that will be needed to complete the study. Description of relevant physical facilities should be included. Additionally, if there are other complimentary programs and/or investigators available, describe them and the relevance that they have to the proposed project.

The GW Office of Human Research (OHR) is the administrative support office for GW’s Institutional Review Board (IRB). OHR has a staff complement of six staff members who are all experts in various areas relating to human subjects’ protection. The IRB is responsible for the review of all research activities that involve human subjects, in accordance with federal regulations. The OHR assists the IRB with reviewing research projects that involve human subjects to ensure adherence to federal law and requirements. Projects involving human subjects research must be reviewed and approved by the IRB before individual subjects may be recruited for participation. Each approved project is re-evaluated at least annually. The OHR works with investigators to modify projects to ensure adequate protection for the rights and welfare of human subjects. OHR administers the GW Human Research Policy which requires all investigators and study team members to take training in Human subjects, responsible conduct of research and conflict of interest. OHR from time to time provides training opportunities for investigators in areas relating to Human subjects.

ANIMAL: SUGGESTED GUIDANCE FROM NSF AND NIH - please remove this section before submitting: If you will be using experimental animals, provide detailed information on the quality of your source, the relative availability of the species/strain chosen (if an uncommon one) and how the animals will be maintained. If the sex of laboratory animals is a potential source of biological variation, which requires that you include both males and females in your research, describe how each sex will be independently housed.

Office of Animal Research

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At GW, the Animal Research Facility (ARF) provides space, equipment, and care for laboratory animals used for research and teaching purposes. ARF is headed by a Director who is a veterinarian with a background in veterinary medicine. ARF is a member of the AAALAC International (https://aaalac.org) and undergoes periodic assessments to ensure humane care and use of laboratory animals. ARF is accredited by the AAALAC International, ensuring compliance with federal, state, and institutional regulations.

Data Use and Management
GW information security policy sets forth information security standards for the protection of Non-Public Information within the University. All GW members have the duty to protect University data from unauthorized generation, access, modification, disclosure, transmission or destruction. Certain data require specialized protections, and in some circumstances, protections may be outlined through data sharing/transfer agreements otherwise referred to as Data Use Agreements (DUAs) with other parties. DUAs are legally binding contracts between GW and another executing party providing for the transfer of data from the provider organization to the recipient organization. OVPR reviews the terms of proposed DUAs so that the data may be accessed and used as soon as an appropriate Data Management Plan has been approved. Data Management Plans (DMPs) are generally required by data providers to document and address all requirements for protecting the data. GW requires a review and risk assessment of the plan for how incoming data will be securely stored on, or accessed by, GW systems or investigators. DUAs generally impose specific security standards and risks on the receiving party hosting the data, which are addressed in a data management plan (DMP). GW provides resources for DMP and DUA development and risk assessment through the Data Services Librarian and the Division of Information Technology’s Office of Risk and Compliance (DIT Compliance). Additionally, GW has various other relevant policies that address data stewardship.

COMPUTING TECHNOLOGY RESOURCES
GW is connected to research and educational communities via wireless access service, Eduroam, a secure, worldwide roaming access service developed for the international research and education community. It allows users from member institutions to connect to the Internet when visiting other participating institutions. GWU is also part of the Internet2 Network, which is a computer networking consortium led by members from research and education communities, industry and government. The SPH's hardware offerings include dedicated research platforms and file servers as well as printers, FAX machines, high-speed photo copiers, overhead and data show projectors. Access to these resources is via high speed wired and wireless network links. There are dedicated resources for data storage, data transfer and sharing and data backup and redundancy.

The software offerings at SPH are also comprehensive. Our capabilities will allow for any required reference retrieval, any other data retrieval or exchange, and online databases access. All faculty, staff, and students have access to electronic mail, and collaboration software such as Webex and Skype to convene and share documentation offsite. SPH faculty and staff members also have access to licenses that include an extensive range of word processing, analytic, graphics, mapping, and presentation software such as, SPSS, Stata, SAS, Atlas.Ti, MPlus, Adobe Creative Suite, Nvivo, Qualtics, and ArcGIS.

Armor Defense
The SPH has established a relationship with the cloud vendor Armor Defense to support a highly secure infrastructure to fulfill the research needs of our faculty, research staff and their students as it relates to high-speed data analysis, data storage, and collaborative data sharing. Armor Defense has customized a service for our SPH researchers and highly secured centrally managed, cloud-based data storage service. This system supports research and applied research instruction of the SPH faculty and their graduate students and post-docs. Researchers may use the system to work with both small- and large-scale research datasets, and collaborate more effectively on research with colleagues and students across schools and departments. It also allows for inter-institutional collaboration in which researchers are able to collaborate and share access to data.

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across the world. Armor Defense is certified against the HITRUST Common Security Framework (CSF) to address HIPAA compliance requirements. The Health Information Trust Alliance (HITRUST), in collaboration with healthcare, business, technology and information security leaders, has established the HITRUST CSF, a certifiable framework that can be used by any and all organizations that create, access, store or exchange personal health and financial information. Armor inherently meets the FIPS 140-2 standard.

**StrongBox** is a customized applications and data storage system that is dedicated to research at the SPH and their faculty and graduate students, and post-docs. Researchers (a) store and preserve their research data for future research and “training” sets for students; (b) work with both small and large-scale research datasets, and (c) collaborate more effectively on research with colleagues and students across schools and departments.

**Specifications:**
- (2) 128GB RAM, dual Intel Xeon E5-2650 2.00GHz, 20M Cache, 8.0GT/s QPI, Turbo, 8C processors
- servers, (1) 36T SAN Storage
- Number of software packages - 10
- Type of interface - VPN and Onsite network access
- Number of registered users - 150

**GWBox** is GW's enterprise file sharing service for online cloud storage and collaboration for GW faculty, staff and students. GW Box uses a two-step authentication process for system access. Two-step authentication provides users with secured access to their online information utilizing a password plus a code sent to a smartphone or device. Users store regulated, restricted and public university data on GW Box.

**Colonial One**
For research needs that use high-performance computing for data analysis, GW uses a shared high-performance computing cluster named Colonial One. Colonial One is housed in one of GW's two enterprise-class datacenters and is located on the Virginia Science and Technology Campus. The datacenter features professional IT management by GW's central Division of IT - including 24-hour on-premise and remote environment monitoring; redundant power distribution including UPS (battery) and generator backup; redundant cooling systems utilizing a dedicated chilled water plant and a glycol refrigeration system; and direct network connectivity to GW's robust 100 Gigabit fiber optic network.

Colonial One’s compute capacity features a total of 2,924 CPU cores and 1132,288 CUDA cores in these compute node configurations:
- 64 standard CPU nodes featuring dual Intel Xeon E5-2670 2.6GHz 8-core processors with varying ranges of RAM capacity (64GB, 128GB, and 256GB nodes) and dual on-board solid state hard drives
- 79 CPU nodes featuring dual Intel Xeon E5-2650v2 2.6 GHz 8-core processors with 128 GB of RAM each
- 32 GPU nodes featuring dual Intel Xeon E-2620 2.0GHz 6-core processors with dual NVIDIA K20 GPUs and 128 GB of RAM
- 1 large-memory node featuring four Intel Xeon E7-8857v2 3.0 GHz 12-core processors with 2 TB of RAM
- FDR InfiniBand network interconnect featuring 54.5 Gbps total throughput, with 2:1 oversubscription per compute node.

**FRESCO** is a high performance virtual environment that provides virtual machines with direct access to a 100GB network infrastructure. It is integrated with the high performance high capacity cluster, Colonial One, located on the GW Virginia Science and Technology Campus (VSTC).

**Research Electronic Data Capture (REDCap)** is a mature, secure, HIPAA compliant, web-based application for building and managing online surveys and databases. It is the database platform of choice in all Clinical and Translational Science Institutes awarded institutions and for other institutions across the globe. REDCap is HIPAA compliant and is 21 C.F.R. part 11 compliant ready. The Clinical and Translational Science Institute at Children’s National (CTSI-CN) is a partnership between Children’s National Medical Center and GW that offers
unique resources in translating discovery to improved health. Since its launch, more than 750 Children’s National Medical Center and GW personnel have requested REDCap accounts and over 1,200 database projects have been created for research or for operational support, among other purposes. There is no charge for current Children’s National Medical Center and GW faculty, staff, sponsored students, and sponsored affiliates conducting clinical and translational research.

OTHER:
Office Environment: Each GW faculty member has a 10x11 sq. ft. furnished office equipped with computers, phones, and all the requisite office functionalities.

LIBRARY FACILITIES:
GW’s extensive library collections are housed in the Melvin Gelman Library, the general academic library, the Jacob Burns Law Library, and the Paul Himmelfarb Health Sciences Library. These collections contain over 2 million volumes and over 20,000 serials and provide an extensive collection of general and specific volumes, periodicals, and papers in health services administration, health policy, business, medical care, economics, operations research, law, human resources management, statistics, and basic sciences. All are important to the SPH and are readily accessible to students and faculty.

The Himmelfarb Health Sciences Library: The Himmelfarb Health Sciences Library, the primary library for the SPH, is located in Ross Hall on the Foggy Bottom campus one block from the SPH’s building and also serves the School of Medicine and Health Sciences and School of Nursing. The Library currently provides electronic access to over 3,500 textbooks, 4,000 journals, and 115 databases. Himmelfarb provides extensive on-site access to online, print and audiovisual collections, as well as access to computers and study areas. The Library's print collections include approximately 100,000 volumes and access to extensive journal backfiles. Over the years, monographic holdings in public health subject areas were extensively reviewed and expanded. The Library's Bloedorn Technology houses more than 400 current DVD and CD titles as well as applications software for word processing, publishing, spreadsheets, databases, and reference management and dozens of specialized software titles focused on medicine, the health sciences, public health, and statistical analysis. Key health sciences databases include MEDLINE, SCOPUS, Global Health, and Health Policy Reference Center. Students also have access to major interdisciplinary databases such as Business Source Complete, ABI/Inform Complete, and Academic Search Premier. The Library provides electronic journals directly from publishers or through vendors such as ABI/Inform, Clinical Key, Ovid, and LexisNexis.

MEETING AND CONFERENCE FACILITIES: Located on the first floor of the SPH, are an auditorium (seats 2257), a convening center with four connecting rooms, and a pre-conference space for receptions. Additionally, two large lecture classrooms (seats 10,090), one executive case room (seats 75) with computer plug-in capacity and tiered audio-equipped seating, 14 classrooms (seats 20-50 each), and seven conference rooms. All of these amenities serve as a venue for continued research and collaboration with a wide variety of government and non-governmental organizations.

The University campus provides several large auditoriums, meeting rooms, and access to hotels for our school to host meetings and conferences. The GW School of Media and Public Affairs building features a 258-seat auditorium designed to attract media events and newsmaker studio for faculty members to hold media interviews. Additionally, the building is equipped with fiber optic networking, Internet access, and teleconferencing classroom. The Cloyd Heck Marvin Center is the George Washington University’s campus community center, regularly used by SPH faculty and staff to host meetings.

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