BROWN UNIVERSITY

Brown University was established with a charter from the Rhode Island Colony’s General Assembly in 1764 as the seventh college in America. Today it is an independent, co-educational, Ivy League institution of higher learning devoted to the liberal arts and professional training. The University consists of undergraduate and graduate programs plus the Alpert Medical School, School of Public Health, School of Engineering, and School of Professional Studies. The Medical School has affiliation agreements with local hospitals. Brown’s vibrant, diverse community consists of about 6,320 undergraduates, 2,230 graduate students, 523 medical school students, more than 5,000 summer, visiting, and online students, and over 700 faculty members. Brown students come from all 50 states and more than 115 countries. The undergraduates pursue bachelor’s degrees in more than 70 concentrations and Brown has 51 doctoral programs and 31 master’s programs. The university is committed to developing and supporting major, cutting-edge research programs, providing effective infrastructure for research and development, supporting administration of research projects, and encouraging dissemination of research results.

WARREN ALPERT MEDICAL SCHOOL AFFILIATED HOSPITALS

The Warren Alpert Medical School is affiliated with the Lifespan and Care New England Healthcare Systems and the Providence VA Medical Center. The Care New England Healthcare System is comprised of Women and Infants Hospital, Butler Hospital and Memorial Hospital. The Lifespan Healthcare System is comprised of Rhode Island Hospital, Hasbro Children’s Hospital, The Miriam Hospital and Emma Pendelton Bradley Hospital. (Please see Facilities and Resources for Lifespan and Care New England Health Systems for detailed description of these affiliated hospitals)

BROWN ACADEMIC AND CLINICAL DEPARTMENTS

Division of Biology and Medicine: Comprising the Program in Biology and the Warren Alpert Medical School (AMS), the Division is home to five basic biology departments offering undergraduate and graduate courses, 14 clinical departments, and 1 hybrid department (with both clinical and campus-based faculty). The Division of Biology and Medicine (BioMed) is the administrative home for faculty whose primary roles are in research, education, or clinical care in the domains of biology and medical science. This organizational structure encourages multidisciplinary instruction and research, a hallmark of education at Brown and unites the departments into a cohesive unit with a common mission: to understand the underpinnings of human life and the study, prevention, and treatment of disease.

The Warren Alpert Medical School: Founded as the Brown University School of Medicine in 1972, it is ranked in the top quartile of medical schools nationally. The Division’s six basic biological science departments are closely integrated with other science departments and are actively involved in the academic and research activities of the University. Fourteen clinical departments are housed at Brown’s seven affiliated hospital partners in the greater Providence area. In 2004, the University received a $100 million endowment from the Sidney Frank Foundation. Using these resources, in August 2011, Brown opened a 63,000 sq. ft. renovated building in Providence’s Jewelry District as the new home of the Warren Alpert Medical School. The building now anchors what has become a diversified, vibrant “knowledge district.”

1. Dermatology: As a model of interinstitutional cooperation in the delivery of medical services and in medical education, the Department of Dermatology thrives by drawing from the combined resources of Brown University, the Brown affiliated hospitals, and the local community. Teaching, learning, and clinical activities take place at all of the affiliated hospitals. The active involvement of community-based dermatologists adds to the quality of teaching and to the caliber and collegiality of the regional Dermatology community. Of special note is the broad demographic and ethnic diversity of the patient population (drawing from throughout Rhode Island, Southeastern Massachusetts, and Southeastern Connecticut) which enriches both the clinical and personal experience of learning here. Since the program’s beginning in 1969, over one hundred and thirty dermatologists have completed training and practice or teach in locations throughout the United States.

2. Diagnostic Imaging: With nearly 60 faculty members, the Department of Diagnostic Imaging at Brown University's Alpert Medical School provides services at four Brown-affiliated hospitals with more than 500,000 imaging examinations performed annually. Faculty members have subspecialty training and
engage in a wide range of research programs, including multicenter trials and work done through Brown University's MRI Research Facility. ACGME-accredited post-graduate training programs are offered in several diagnostic radiology subspecialties, including interventional radiology. The department's radiology residency program currently enrolls twenty-eight residents, graduating seven residents per year. The one-year fellowship in vascular and interventional radiology offers three positions each year. The one-year fellowship in breast imaging offers two positions each year. Finally, the body imaging fellowship offers two positions per year.

3. **Emergency Medicine**: Established in 2004, the Department of Emergency Medicine's mission is to provide exceptional emergency medical care, education, research, and service to the people of Rhode Island and beyond. The Department's seventy-nine faculty members see over 225,000 patients per year in the emergency departments at Rhode Island Hospital (a Level 1 trauma center), The Miriam Hospital, Memorial Hospital of Rhode Island, and Hasbro Children's Hospital - the only pediatric emergency department in southeastern New England. The Department has a highly regarded emergency medicine residency program (established in 1993) that trains twelve residents per year to become future leaders in emergency medicine. A robust and diverse research program attracts over $2.4 million in external funding. The Department of Emergency Medicine has active research and education programs in Pediatric EM, International EM, Injury Prevention, Medical Simulation, Emergency Medical Services, and Emergency Ultrasound.

4. **Family Medicine**: The Department of Family Medicine is a leader in patient and relationship-centered practice, research, and educational programming aimed at improving health outcomes for patients, families, and communities. The Department’s primary mission is to create a primary health care system that is personal, high quality, responsible, accessible, sustainable, and just. The Department’s graduates, faculty, and partners provide care throughout the nation and the world, and comprise two-thirds of the family physicians in Rhode Island. The major training and clinical site for the Department is its model Family Care Center (FCC). Located on the main campus of the Memorial Hospital of Rhode Island, the FCC provides comprehensive patient care to the residents of Pawtucket, Central Falls, and surrounding areas. The Department is home to the Family Medicine Residency Program, which enrolls thirteen residents per year for three years of training, as well as Fellowship Programs, such as Maternal and Child Health. Its Pre-Doctoral Division directs the required core clerkship in family medicine for Alpert medical students, as well as a multiplicity of other courses and programs. Faculty, residents, and students conduct research projects in cardiovascular prevention, smoking cessation, primary care genetics, HIV care, and in other areas. The Center for Primary Care and Prevention, a Brown research collaboration with Community Health, is located right above the Family Care Center, facilitating translational clinical research. Working in a collaborative manner with other primary care physicians, allied and mental health professional physical and community advocates, the Department aims to help individuals and whole communities reach the highest possible levels of health and function.

5. **Neurology** provides a comprehensive and integrated program of clinical care, education, and research dealing with diseases of the brain, spinal cord and neuromuscular system. The Adult Neurology service is based at Rhode Island Hospital, including the Neurology Foundation office, with affiliated services based at Memorial Hospital of Rhode Island and Butler Hospital. A well-established Child Neurology program provides inpatient services at Hasbro Children's Hospital and outpatient services at Rhode Island Hospital. Neurology and combined Neurology/Psychiatry residency training programs are an integral part of the division’s postgraduate educational activities as well as subspecialty fellowships in a variety of disciplines. Clinical research by faculty includes collaborative efforts with the Neuropathology and Neurosurgery divisions at Rhode Island Hospital, including the Norman Prince Neurosciences Institute, and translational research activities with faculty on the Brown University campus.

6. **Neurosurgery**: The Neurosurgery Foundation is an academic group of physicians specializing in neurosurgery and neuro-oncology. In addition to providing patient care, as faculty members at The Warren Alpert Medical School of Brown University, Neurosurgery conducts research and trains residents. Faculty also participate in the activities of the Norman Prince Neuroscience Institute at Rhode Island Hospital. Neurosurgery's services and facilities have drawn patients from all over New England and the nation, as well as from outside the United States.

7. **Obstetrics and Gynecology**: The Department of Obstetrics and Gynecology comprises a range of clinical settings and administrative units that provide residents and fellows with diverse training opportunities.
The Division of Ambulatory Care provides women of all ages comprehensive primary and tertiary-level outpatient services, including prenatal care, gynecologic care, family planning, urogynecology, pediatric gynecology, substance abuse counseling and treatment, nutritional consultation, social service consultation, behavioral health consultation, chiropractic consultation, ultrasound, fetal evaluation, and colposcopy. The Division of Ambulatory Care includes the Women's Primary Care Center, which serves as a training site for medical students, residents, and other health care professionals and conducts numerous research studies in women's primary care and reproductive health issues.

Division of Maternal-Fetal Medicine provides pre-pregnancy and perinatal care for its own at-risk patients. As the only MFM service in southeastern New England, it provides consultative services for most obstetrical practices in the region. The division offers an integrated array of antenatal, diagnostic imaging and genetic counseling services through its outpatient Prenatal Diagnosis Center. In addition, consultative and imaging services are offered through satellite programs in nearby New Bedford and Foxboro, MA, and at Charlton Memorial Hospital in Fall River, MA, and South County Hospital in Wakefield, RI. In concert with surgeons from Hasbro Children's Hospital, the division offers a fetal surgery program and has pioneered treatment for twin-to-twin transfusion syndrome.

Division of Reproductive Endocrinology and Fertility offers a complete range of assisted reproductive technologies, such as intracytoplasmic sperm injection, assisted hatching, preimplantation genetic diagnosis, oocyte freezing and in vitro maturation. In addition, the division is dedicated to the furtherance of education, research and clinical care in reproductive medicine and surgery, adhesiology, reproductive anomalies, menopause, endometriosis, pediatric gynecology, and disorders of puberty, ovulatory function, hirsutism, and galactorrhea.

The Program in Women's Oncology, comprising the Division of Gynecologic Oncology and the Breast Health Center, is the region's leading cancer treatment center. Treatment recommendations consider both the exact type of malignancy and the circumstances of the patient and her family. The Program supports the best possible care through its extensive network of relationships developed across New England.

Women & Infants’ Breast Health Center, part of the Program in Women’s Oncology, is a specialized resource for patients and a consultative service to physicians offering comfortable facilities, advanced technology, specialized expertise, prompt evaluation and a full spectrum of contemporary treatment options. The Breast Health Center actively participates in both clinical and basic science research in the effort to advance the knowledge and treatment of breast cancer. As part of the Program in Women's Oncology, fellows gain experience with multi-institutional research groups (i.e., Cancer and Acute Leukemia Group B (CALGB), Brown University Oncology Group (BrUOG), National Surgical Adjuvant Breast and Bowel Project (NSABP), American College of Surgeons Oncology Group (ACSG)). The Program in Women's Oncology and Women & Infants Hospital are dedicated to basic science research and has laboratory space in the Kilguss Research Institute which is a 25,000 sq. ft. facility which provides a collegial environment for collaboration.

Division of Medical Education oversees the Medical School's six-week core clerkship in gynecology-obstetrics, which has achieved national recognition for educational innovation in faculty development and performance-based assessment. The Division also sponsors a highly sought-after residency program and outstanding fellowship programs in maternal-fetal medicine, gynecologic oncology, urogynecology and reconstructive pelvic surgery, epidemiology, breast health, and reproductive endocrinology and infertility.

The Division of Research in Women's Health aims to develop innovative research to improve women's health through interdisciplinary collaboration and the provision of necessary research infrastructure, including research methodology, database management and statistical analysis. Integrated into the division is the George Anderson Outcomes Unit, which focuses on patient-oriented outcomes research.

The Triage Unit serves as Women & Infants' emergency department, providing acute care for obstetrical and gynecologic urgent and emergent problems 24 hours a day, seven days a week. It boasts state-of-the-art ultrasound equipment and collaborates with radiology for other needed procedures. It coordinates with labor and delivery, antepartum units, and operating room and inpatient gynecology floors, and facilitates follow-up with patients' primary physicians. In its efforts to improve the hospital experience for sexual assault victims, the unit initiated a sexual assault nurse examiner program.
The Division of Urogynecology and Pelvic Reconstructive Surgery provides diagnosis and treatment for women with voiding and bowel dysfunction and associated pelvic floor abnormalities. Faculty in the division have expertise in urinary incontinence, pelvic organ prolapse, interstitial cystitis, fistulas, and chronic pain of elusive origin. The division is a referral service for reproductive tract anomalies, sacral stimulators for chronic urge incontinence and urinary retention, and urethral injection materials and transvaginal mesh systems for prolapse repair.

Nurse Midwifery Program The program supports the educational goals of Brown medical students and obstetric residents, augments clinical services provided by obstetric residents, and advances the academic mission of the department and the scope of nurse midwifery through participation in national and international presentations, publications and research projects. It is nationally known for its innovative approaches to integrating nurse midwives into the teaching faculty for both residents and medical students. Visitors from around the country frequently come to observe this program in action.

8. Orthopaedics: The Department of Orthopaedics at the Warren Alpert Medical School of Brown University is one of the four oldest fracture services in the country and its residency program has been in existence since 1938. The Department of Orthopaedics at the Warren Alpert Medical School of Brown University is one of the four oldest fracture services in the country and its residency program has been in existence since 1938. The Total Joint Center at The Miriam Hospital performs nearly 1000 joint arthroplasty surgeries, including hip, knee, ankle, shoulder, elbow, and wrist replacement. Furthermore, the Orthopaedic surgeons at Rhode Island Hospital perform an average of 14,000 operations and receive nearly 200,000 office visits per year at University Orthopedics, the practice arm of the full-time orthopaedic faculty. The faculty supervised/resident run continuity clinics see approximately 75,000 patient visits over the course of a year. Subspecialty experience in Pediatrics, Tumor, Trauma, Sports Medicine, Hand Surgery, Shoulder and Elbow, Adult Reconstruction, Foot and Ankle and Spine is all obtained at one of the Department's local facilities. Opportunities for both clinical and basic science research are available and each resident has four months of protected research time during the residency. The Orthopedic research laboratory at Brown University is one on the top-funded orthopedic labs in the country, with projects ranging from ligament reconstruction, cartilage biomechanics and biochemistry, molecular biology to mechanical testing of spine constructs and 3D kinematic modeling. The research division is staffed by a cadre of full time scientists who assist residents in experimental design, technique, and data analysis.

9. Pediatrics: The Department of Pediatrics encompasses the clinical care, cutting edge research, and academic pursuits of both hospital-based and community pediatricians. More than half of the two hundred faculty members are located on the Brown campus, at Rhode Island Hospital, Women & Infants Hospital, Bradley Hospital, and Memorial Hospital of Rhode Island. The faculty base also includes the community pediatricians who have private practice offices throughout the state of Rhode Island and Southeastern Massachusetts. All campus and hospital-based faculty participate in teaching and advising undergraduates, graduate students, medical students, residents, as well as post-doctoral and clinical fellows. The Pediatrics residency program, along with the Medicine/Pediatrics residency and Triple-Board residency programs train a collective total of 96 residents. Fellowships are offered in eight subspecialty areas of pediatrics, including neonatology, gastroenterology, hematology/oncology, pathology, developmental/behavioral medicine, infectious diseases, and child protection. Research efforts have recently made headlines in the areas of childhood asthma, facial asymmetry, and eating disorders. Ongoing research collaborations exist with the COBRE Center for Cancer Research, the Department of Orthopaedics Research labs, and the Bradley Hasbro Research Center.

10. Psychiatry and Human Behavior: The Department of Psychiatry and Human Behavior (DPHB) is among the outstanding academic departments of psychiatry in the United States. The DPHB has a diverse and talented faculty who provide trainees and students with numerous educational opportunities in three residencies, two fellowship programs, a psychology internship program, and seven postdoctoral training programs. The Department has over $50 million in externally sponsored research in innovative programs which are integral to the department's mission to further understanding regarding the etiology and treatment of psychiatric illnesses. This commitment to education, translational research and clinical care is the foundation of the DPHB's tradition of excellence.

11. Radiation Oncology: The Department of Radiation Oncology is located at Rhode Island Hospital and works with all other departments in the Comprehensive Cancer Center to make available a full spectrum of care
for cancer patients and their families. Many advanced technology treatments are offered by the Department that are not available elsewhere in the state or the region, including image-guided radiation therapy, radiosurgery, and high-dose remote afterloading brachytherapy. The Radiation Oncology Residency Training Program is one of the oldest in the country, providing clinical training and research experience under the guidance of the Department's radiation oncology and medical physics faculty. Research conducted by the Department has led to a number of developments that translate to more effective treatments for patients including development of short-course brachytherapy for breast cancer, intensity modulated radiotherapy, radiosurgery, and computer-based techniques to precisely calculate radiation doses.

12. Surgery The Department of Surgery encompasses the divisions of General Surgery, Anesthesiology, Cardiothoracic Surgery, Critical Care Medicine (Surgery), Ophthalmology, Oral Maxillofacial Surgery, Otolaryngology, Pediatric Surgery, Plastic Surgery, Surgical Oncology, Surgical Endocrinology, Trauma and Burns, Vascular Surgery, and Urology. The goal of the Department is to foster an environment for the optimal education of residents and medical students and to prepare them to assume their roles in scientific and medical communities. Faculty are responsible for teaching medical students in the required core clerkship in surgery. Fellowships are offered in three subspecialties. The Department has a robust Division of Surgical Research which boasts an NIH-sponsored Trauma and Inflammation Research Training Fellowship.

13. Pathology and Laboratory Medicine The Department of Pathology and Laboratory Medicine is a hybrid department that bridges basic science, translational and clinical research, and diagnostic pathology. Seventy faculty members are located on the Brown campus, at the affiliated hospitals, the Rhode Island Blood Bank and the Office of the Medical Examiner at the Rhode Island Department of Health. All campus and hospital-based faculty participate in teaching and advising undergraduates, graduate students, medical students, residents, and postdoctoral and clinical fellows. The Department's residency program trains up to sixteen residents per year in anatomic and clinical pathology. Fellowships are offered in five subspecialty areas of pathology. The Department is home to a Superfund Basic Research Program and an NIEHS Training Program in Environmental Pathology. Clinical and translational research focuses on cancer, aging and neurodegenerative disease, and prenatal diagnosis and early pregnancy loss. Interdisciplinary research programs include global health, reproductive toxicology, and nanotechnology and nanotoxicology.

14. Medicine: The Warren Alpert Medical School of Brown University is comprised of eleven distinct Medical Specialties known as Divisions. These Divisions, working in conjunction with the community doctors who comprise the Primary Care offerings, provide patients with an outstanding level of care both within the Brown affiliated hospitals and throughout several community-based clinical locations. In addition to patient services, several of the Divisions offer exceptional programs for Residents and Fellows within their designated areas of expertise. Residents and Fellows enjoy an outstanding diversity of patients, superb facilities, excellent faculty, a balanced curriculum, and a supportive nurturing environment in which they are challenged to reach their full potential. The department strives to interact with the community and works to heighten community involvement through several avenues.

The Division of Cardiology is a large clinical and research division with a mission of patient care, teaching and research excellence. Division faculty staff the three major teaching hospitals in Providence: Rhode Island Hospital, Miriam Hospital, and the VA Medical Center. The division also includes the Lifespan Cardiovascular Research Center, a multidisciplinary basic research facility located near the medical school. Clinical activities in the division include all major aspects of cardiology, including general clinical cardiology, advanced cardiac imaging, interventional cardiology, electrophysiology, heart failure, vascular medicine (including peripheral interventions), and preventive cardiology. State-of-the-art clinical facilities are available in all locations, and clinical research is actively pursued at each site. The Division of Cardiology is closely linked to the Lifespan Cardiac Surgery Program (one of the largest in New England), with recently renovated surgical suites and adjacent coronary care and CT surgery intensive care units. Furthermore, Rhode Island and Miriam Hospitals provide the bulk of emergency care in the state of Rhode Island, with approximately 200,000 emergency visits annually, a large number of whom have acute cardiac illnesses.

The Division sponsors several fellowship programs. The main program is the general cardiology fellowship, which is a three year (minimum) program with an emphasis on training outstanding clinical cardiologists. Several additional sub-subspecialty fellowship programs are offered: Interventional cardiology, clinical cardiac electrophysiology, preventive cardiology, and peripheral vascular medicine. For candidates with an
interest in developing academic careers in clinical or basic research, additional years of training are available, including an NIH T32 training grant with both clinical and basic science tracks. The clinical arm of the T32 may involve selected courses at the School of Public Health. The large volume of patients with acute cardiac illnesses, driven in part by the busiest emergency department in New England, creates a very unique environment for education and clinical research.

Research within the division is focused on advancing clinical and basic science related to cardiovascular disorders. Clinical research programs are focused on general cardiology, cardiac imaging, interventional cardiology, and electrophysiology. Basic science programs, focusing on the molecular mechanisms of rhythm disorders of the heart (cardiac arrhythmias), sudden cardiac arrest, heart enlargement (hypertrophy) and heart failure are located within the Cardiovascular Research Center (CVRC). CVRC facilities include a sophisticated invasive animal catheterization and electrophysiology laboratory, and a brand new state-of-the-art research facility that is used for the studying of genetically modified mouse and rabbit models of cardiac diseases. Cardiovascular research areas of interest at Providence VAMC include epidemiology, health services and outcomes (anemia, diabetes and heart failure), clinical imaging research, and preclinical research in areas of pulmonary hypertension and right heart failure. Providence VAMC and Vascular Research Lab include facilities for cellular electrophysiology, molecular biology, small animal imaging, heart and lung physiology lab, and live cell imaging.

**Division of Endocrinology** was established at Brown Medical School and its affiliated hospitals in 1984. It recently has undergone major expansion with the development of the new Hallett Center for Diabetes and Endocrinology, a Bone Density Unit with state-of-the-art diagnostic and osteoporosis management capabilities, an outpatient Clinical Research Unit, and the new Diabetes and Endocrinology Research Laboratories. The core clinical staff members of the Division provide outpatient and inpatient care and consultative services in endocrinology and diabetes at Rhode Island Hospital and the Providence VA Hospital. Affiliated endocrinologists provide patient care services and active teaching programs for medical students, residents, and clinical fellows at The Miriam Hospital, the Roger Williams Medical Center, and the Memorial Hospital of Pawtucket. In addition to patient care services, the Endocrine Division has vigorous clinical and basic research programs and provides subspecialty training in Endocrinology, Diabetes, and Metabolism through an ACGME-certified clinical fellowship program. The Division also conducts teaching programs for Brown Medical School students, medical residents, Ph.D. graduate students, and postdoctoral research fellows, plus CME programs for medical professionals.

**The Division of Gastroenterology** at Alpert Medical School is located at Rhode Island Hospital, The Miriam Hospital and the Providence Veteran's Administration Medical Center. The Liver Research Center is located approximately 7 - 10 minutes by Hospital transport bus. The major missions of the Division are to provide state-of-the-art treatment for patients with gastrointestinal and liver diseases, to educate undergraduates, medical students, medical residents and postdoctoral fellows in the pathophysiology of digestive diseases and to provide a strong basic science program for advancing the understanding of disease processes at the cellular and molecular level.

**The Division of General Internal Medicine (DGIM)** faculty includes 34 full-time faculty and over 100 clinical/part-time faculty across 5 of the Brown Medical School's Affiliated Hospitals in Rhode Island - Rhode Island Hospital, Memorial Hospital of Rhode Island, The Miriam Hospital, VA Medical Center and Women & Infants' Hospital. The General Internal Medicine division, based at RIH and TMH, sponsors a wide array of educational, patient care and research activities. Examples of such activities include:

Education. DGIM faculty are responsible for major roles in graduate medical education and residency leadership within the Department of Medicine. DGIM members are responsible for curriculum development, residency scholarship, quality improvement activities and department-wide faculty development. This Division is also home to one of the country's oldest Primary Care Residency programs, with a strong emphasis on behavioral medicine. A new substance abuse fellowship has been added and plans are underway for further advanced training opportunities. Members of this division hold major leadership positions in National GME organizations such as the American College of Physicians, Society for General Internal Medicine, Clerkship Directors in Internal Medicine and Association of Program Directors in Internal Medicine.
Clinical Care. DGIM clinical activities include several academic clinical practices in Primary Care, as well as a longstanding Women's Health practice. Faculty teach and supervise residents and interns on the geographically-oriented inpatient general medicine wards at RIH. Finally, DGIM faculty are responsible for leadership, education and precepting in resident continuity clinics as well.

Research. HIV prevention and care, substance use disorders, and tobacco cessation are some of the subject areas investigated and presented nationally.

**The Division of Geriatrics and Palliative Medicine** in the Department of Medicine, is the base for all academic activities in Geriatrics and in Hospice/Palliative Medicine (HPM), including the Geriatric Medicine Fellowship Program and the HPM Fellowship Program. This program is based at Rhode Island Hospital and The Miriam Hospital in Providence, Rhode Island. The mission of Geriatrics and Gerontology at The Warren Alpert Medical School of Brown University is to improve the well-being of older Americans through teaching and research programs in aging, particularly in relation to health and health care. All teaching faculty are experts in clinical geriatrics and include 14 certified geriatricians, 6 geriatric nurse practitioners, 3 neurologists, and 4 geriatric psychiatrists. Nine physicians are certified in HPM, two of whom are dual-certified in both geriatrics and HPM.

**The Center for Gerontology and Health Care Research**, located on the Brown University Campus, is one of 11 research centers of the Brown School of Public Health, and is the major research resource for fellows and faculty. The Center is strongest in health services research on aging and chronic disease, especially long-term care. Fifteen full-time research faculty and 13 staff are based in the Center. External funding exceeds $7 million annually. Nine PhD and 4 MD faculty are available to serve as research mentors to fellows and residents. The Geriatric Medicine and HPM

**The Division of Hematology/Oncology** was formed when The Miriam Hospital Hematology/Oncology Division, the Rhode Island Hospital Division of Hematology and the Rhode Island Hospital Department of Medical Oncology merged in 1999. The division includes thirteen MD's, six PhD's, nurses, pharmacists, social workers, protocol nurses and staff, cancer registrars, lab technicians and secretaries. The Division’s mission is to achieve academic excellence in basic research, clinical research and education, and to provide the highest quality of care to patients. Clinical research is conducted under the direction of the Brown University Oncology Group (BrUOG), which is chaired by Dr. Howard Safran. Patients are offered state of the art cancer chemotherapy protocols, both via national cooperative groups as well as local protocols. Brown Medical School has an active and productive fellowship program. Under the leadership of Dr. Humera Khurshid, the Division has ten fellows who spend three years gaining board eligibility in both Hematology and Medical Oncology. During their stay in the program, the fellows gain expertise not only in the clinical management of patients, but also in writing and implementing clinical trials for cancer patients.

The Division of Hematology/Oncology provides a full range of services to patients both in the ambulatory and hospital settings. At both The Miriam Hospital and Rhode Island Hospital, newly renovated outpatient space allows for the diagnosis and treatment of the entire range of hematologic and oncologic disorders. Dedicated inpatient units at hospitals allow nursing expertise and other support services to best meet patients’ needs. A recent goal has been the establishment of multidisciplinary clinics for all the major malignancies. This allows the patient to receive the expertise of the surgeon, radiation oncologist and medical oncologist at the time of their first visit.

**The Division of Infectious Diseases** was established in 1966 at the Brown Medical School. It provides comprehensive inpatient and outpatient infectious disease care at The Miriam and Rhode Island Hospitals, Memorial Hospital, Providence VA Medical Center, and Women and Infants Hospital. The mission of the Division is to provide state of the art care for all patients with any type of infectious disease, to teach and mentor medical students, house officers and fellows in the art and science of infectious diseases, and to pursue clinical and basic research that investigates the manifestations and treatment of infectious diseases. The Division Director is Eleftherios Mylonakis, MD, PhD, FIDSA.

The Division has a number of areas of expertise including Bacteriology, Global Health, HIV/AIDS, Infection Control, Virology and sepsis research. The Division is active in clinical, translational, and basic science research and in FY2013 received close to 15 million dollars in external funding. The Division hosts a 2 year clinical fellowship in infectious diseases and an NIH funded T32 fellowship in clinical research on infections.
related to substance abuse. Members of the Division are active teachers within the Brown University Department of Medicine and work closely with the School of Public Health, and the Brown Global Health Initiative.

**The Division of Kidney Disease and Hypertension** was established in 1966 and oversees all research and education in nephrology at Brown Medical School. Its facilities include; dialysis units at the Miriam, Rhode Island and VA Hospitals, 3 outpatient dialysis centers in the greater Providence area, a renal outpatient area in Rhode Island Hospital, a joint medical-surgical transplant unit with contiguous office and clinic space in Rhode Island Hospital, a nephrology library and conference room, a clinical research unit, faculty and fellow offices, and modern research laboratories. The Division has three main missions: first, to provide state-of-the-art care for patients with kidney disorders; second, to teach nephrology to medical students, house officers, and renal fellows; and third, to conduct clinical and basic research on kidney function and disease. Full-time faculty members provide out-patient services at the Renal, Hypertension and Transplant outpatient sessions at the Rhode Island, Miriam and VA Hospitals, attend on consultation and inpatient services at the Rhode Island, Miriam, VA, Women & Infants Hospitals, and carry out many teaching activities on the University Campus, in its affiliated Hospital Centers and in the outpatient dialysis centers. Several members of the faculty direct highly successful, externally funded clinical and basic research programs that also involve students, residents, as well as nephrology and post-doctoral research fellows.

**The Brown Academic Division of Obstetric Medicine** is based at The Miriam, Rhode Island and Women & Infants Hospital and is a new academic division at Brown, making Brown the first in the US with such a Division. This places the Department of Medicine at the forefront of this field just as evidence is emerging about the link between pregnancy outcomes and risk for cardiovascular disease, diabetes and renal disease.

The Obstetric Medicine Division is multidisciplinary and has an international reputation that is thriving in all aspects of academic medicine. The Multidisciplinary Obstetric Medicine Specialty Services (MOMS) is a tumor board style review of medical OB cases, done jointly with other subspecialty divisions in the department. The Division serves as a major resource to all of the clinical services, both at WIH and RIH for any medical or psychiatric illness in pregnant patients, and for critical care obstetrics. As well, Obstetric Medicine is part of The Women's Medicine Collaborative that was established at Lifespan in the summer of 2011 as an outpatient medical center with all its services under one roof. The WMC is focused on personalized, comprehensive caring for women at all stages of life. With a trademark brand of "For women. By women.", the WMC is the home of outpatient specialty practices for medical problems in pregnancy and perinatal behavioral health.

Teaching: The Division members developed the National Obstetric Medicine Curriculum for internal medicine trainees and were part of the International Committee that developed the International Curriculum and core competencies for Obstetric Internists. GI fellows on the Women's Digestive Disorders track and CL fellows from Psychiatry train with Obstetric Medicine. The Division members run the national courses in Obstetric Medicine for the American College of Physicians, the Society of Maternal Fetal Medicine, the Society of Obstetric Anesthesiology and Perinatology, and have been the faculty for medical content in pregnancy at the American College of Chest Physicians, the American Society of Echocardiography and AGA. The Vice President, Secretary/Treasurer and Past President of the North American and International Societies of Obstetric Medicine as well as Executive Committee Members, The President of the North American Society for Psychosocial Obstetrics & Gynecology and the training officer of the International Society of Obstetric Medicine are from the division.

**The Division of Pulmonary, Critical Care and Sleep Medicine** at the Warren Alpert Medical School of Brown University has been serving the southern New England community for over four decades. The Division is an academic department with faculty at four hospitals throughout Providence dedicated to state-of-the-art patient care, educating the next generation of physicians, and furthering medical research. The faculty provide care at the Rhode Island Hospital, The VA Medical Center, Memorial Hospital and The Miriam Hospital. At these hospitals, faculty manage and staff the intensive care units, as well as inpatient pulmonary consultation services, outpatient pulmonary clinics, pulmonary rehabilitation and sleep disorders
The Division of Rheumatology is involved in clinical, educational and research activities. The mission of the Division is to pursue and maintain clinical excellence in the medical care of patients with arthritis, musculoskeletal, autoimmune and inflammatory diseases. The Division provides outpatient services to patients with a variety of autoimmune and musculoskeletal illnesses ranging from osteoarthritis and rheumatoid arthritis to systemic lupus erythematosus and scleroderma. In addition, the Division provides consultation services for inpatients with rheumatologic problems at Rhode Island Hospital. The Division of Rheumatology also sponsors a Rheumatology Fellowship Training Program that is ACGME approved and based at Rhode Island Hospital. The Division of Rheumatology also carries out clinical and basic research activities performed by faculty members and Fellows in the Division.

The Program in Biology: This Program promotes basic scientific research aimed at discovery of fundamental insights into living systems at all levels of complexity with a major emphasis on relevance to human health and disease mitigation. Faculty of the Program in Biology conduct research on all levels of biological organization: molecular, cellular, organismal and population, and concentration programs with varying degrees of multidisciplinary or specialty foci. The close administrative relationship with The Warren Alpert Medical School offers additional opportunities for blending fundamental biology and clinical sciences in research projects across the institutions. These multidisciplinary research opportunities are a hallmark of Brown University's biomedical programs. Campus-based faculty (124), with primary appointments in the life and biological sciences, collaborate regularly with hospital-based academic faculty members (615) pursuing research at area hospitals.

Ecology and Evolutionary Biology (EEB) Research and instruction in the Department is directed toward understanding biological systems at the individual, population, and community levels of organization utilizing both plant, animal, and microbial systems. Major research areas pursued by faculty and students include functional morphology, foraging ecology, the adaptive significance of animal behavior, sexual selection in plants and animals, insect mating behavior, plant population genetics, molecular population genetics and evolution, marine community ecology, theoretical population and community ecology, and ecosystem ecology. Graduate study in ecology and evolutionary biology at Brown University leads to the PhD degree. A core of faculty and postdoctoral researchers engaged in cutting edge research guides students. Students further benefit from the Department's academic collaborations across University and Alpert Medical School departments and programs. Faculty and students are also active prominently in the Environmental Change Initiative, a multidisciplinary center at Brown tackling the complex issues undergirding environmental change.

Molecular Biology, Cell Biology and Biochemistry (MCB) The Department of Molecular Biology, Cell Biology and Biochemistry is a basic science department within the Brown University Division of Biology and Medicine. Its core areas of scholarship are broad and encompass biochemistry, cell biology, developmental biology, and genetics. The department supports undergraduate, graduate, and medical education in these fields, offering a large variety of courses from introductory to highly specialized levels. The department currently houses 28 primary faculty whose research programs cover a wide array of biological questions, model systems, and methodological approaches. The biological phenomena under investigation range from embryonic and neuronal development, reproduction and genetics of behavior to neurodegeneration and aging. The biological mechanisms being addressed include DNA replication, recombination and transcription, RNA processing and transport, protein translation, protein folding and turnover, vesicular transport, and numerous aspects of molecular signaling. Model systems range from prokaryotic, through plant and several metazoan species to mammals including humans. Classical biochemical and genetic approaches are used alongside cutting edge technologies including genomics, proteomics, X-ray crystallography, and mouse transgenics. The department is also the centerpiece of an interdisciplinary and interdepartmental graduate program in Molecular Biology, Cell Biology and Biochemistry leading to the PhD degree.

Molecular Microbiology and Immunology (MMI) department supports undergraduate, graduate, and postdoctoral education by providing an interdisciplinary structure for training programs. The department's overall mission is to maintain an active and integrated research program for studying the interactions between pathogenic microbes and their hosts that influence the outcome of infections. MMI fosters collaborative studies within the department as well as with faculty in other departments, both on campus and hospital-based. MMI provides instruction and a nurturing environment for undergraduate, graduate, and medical
students in the areas of microbiology and immunology. MMI's instruction includes lecture courses, seminar courses, and laboratory research (undergraduate independent study and graduate thesis).

**Molecular Pharmacology, Physiology and Biotechnology (MPPB)** Guided by a mission to apply insight gained from scientific inquiry to advance the treatment of illness and injury, faculty research interests within MPPB are diverse and include molecular and structural pharmacology; the molecular and cellular basis for drug addiction; cellular and intracellular signaling in cancer and neurodegeneration; macromolecular structure; cellular, comparative, and organ systems physiology; biomaterials; organ replacement, tissue engineering, gene therapy, and regenerative medicine. Research objectives are translated into innovation by faculty with extensive experience in the biotechnology and biomedical device industry. The Department's 14 faculty members support graduate, medical, and postdoctoral education within an interdisciplinary framework of training programs in classical theory and newly emerging areas of biomedical sciences. Doctoral degree programs are offered in three programmatic tracks.

**Neuroscience** The mission of the Department of Neuroscience is to do excellent teaching and research on the basic functions and diseases of the nervous system. Areas of interest include neural plasticity, information processing, and neuronal and synaptic functions, particularly as they relate to development, sensory perception, motor behavior, and cognition. The 20 campus-based neuroscience faculty train undergraduate, graduate, postdoctoral, and medical students in molecular, cellular, developmental, systems, cognitive, and theoretical neuroscience. There are currently forty-two doctoral students in the Neuroscience Graduate Program and the innovative Brown-NIH Graduate Program Partnership, and 122 undergraduate students are enrolled in the neuroscience concentration. Members of the Department also participate in the MRI Research Facility, the Center for Vision Research, and several NIH and NIMH training grants for graduate and postdoctoral fellows studying neuroscience and vision sciences. The Department is also a cornerstone of Brown's Institute for Brain Science, a multidisciplinary consortium of about ninety faculty from eleven departments that promotes collaborative theoretical and experimental studies of the brain, and the Norman Prince Neurosciences Institute at Rhode Island Hospital.

**The Department of Pathology and Laboratory Medicine** forms a bridge between the basic sciences and clinical medicine, bringing the newest scientific concepts to enhance understanding of the biologic basis of disease. Basic science research in pathobiology addresses how a sequence of biologic events leads to a disease state. Translational and clinical research bridges basic mechanistic research to advances in clinical diagnosis and treatment of human disease. Diagnostic testing in pathology and laboratory medicine at Warren Alpert Medical School of Brown University is performed at the hospital affiliates; a total of 90 faculty are located at Brown University, Rhode Island Hospital, The Miriam Hospital, Women & Infants' Hospital, Memorial Hospital of Rhode Island, and the Office of the Medical Examiner at the Rhode Island Department of Health. All campus and hospital-based faculty participate in teaching and advising undergraduates, graduate students, medical students, residents, and postdoctoral and clinical fellows. These trainees work together in multidisciplinary teams involving pathologists, biomedical scientists, clinicians, chemists, and engineers on basic and applied research projects related to human disease.

**The School of Public Health:** In 2014, the University Corporation (governing body) approved the establishment of the School of Public Health and the Director of that Program, the Associate Dean for Public Health and Public Policy arrived in late 2000. The new School builds upon a strong and mature research base, comprised of 11 affiliated research centers, including the Center for Gerontology and Health Care Research. In addition to conducting nationally recognized public health relevant research, these centers provide fellows: (1) opportunities to participate in large scale population based research and public health intervention studies; (2) access to data sets available from ongoing funded grants; (3) technical assistance and mentoring in research methods, (4) access to research tools such as Computer Assisted Telephone Interview equipment and ongoing surveys, and (5) consultation in the use of cutting edge statistical methods and software. Moreover, Centers have large and well trained staff who serve as resources to students. The School of Public Health, led by Dean Bess Marcus, provides the administrative umbrella for both the affiliated research centers and the four Departments. The academic and teaching programs are led by academic Departments traditionally included in Schools of Public Health; Biostatistics, Epidemiology, Behavioral and Social Sciences and Health Services, Policy & Practice. Department faculty teach undergraduates, MPH students, master's students in Biostatistics, Epidemiology and Behavioral and Social Sciences as well as doctoral students in all four Departments. Altogether, each year the
Public Health Program has over 400 undergraduates, 200 MPH and master’s students, 60 pre-doctoral students in addition to over 20 different post-doctoral fellows.

The Department of Behavioral and Social Sciences (BSS) is a multidisciplinary academic department in the Brown University School of Public Health. Over 50 BSS faculty members are actively engaged in research and teaching to understand the behavioral and social determinants of public health problems and to develop interventions to change behaviors and improve social contexts related to public health. BSS faculty conduct collaborative research with a substantive focus on behavioral health issues such as alcohol and other drug abuse; smoking and tobacco use; obesity, nutrition, and physical activity; HIV and sexually transmitted infections; and health disparities and culture. The Department of Behavioral and Social Sciences offers courses of study leading to Master of Science (ScM) and Doctor of Philosophy (PhD) degrees in Behavioral and Social Health Sciences. BSS faculty also teach and advise Brown undergraduates and train and mentor postdoctoral research fellows.

The Department of Biostatistics. The mission of the Department of Biostatistics at Brown is to conduct fundamental research that generates new discoveries in theory and methods of statistics and data science; to provide expertise and leadership and to promote interdisciplinary research in domain areas related to human health and the life sciences; to develop future researchers and professionals in the field of biostatistics through a graduate program that combines rigorous training in theory and methods with meaningful engagement in interdisciplinary research; to provide high quality courses and mentoring in biostatistics and data science for the broader community of students and researchers at Brown; and to serve the academic community at Brown and the scientific community at large by providing intellectual and organizational leadership and collaboration on programs in the statistical and data sciences.

The Department of Epidemiology. The primary mission of the Department of Epidemiology is to provide excellence in teaching and training in the field of epidemiology. The graduate program offers master's and doctoral degrees to prepare students for careers in research or professions in public health which require knowledge of advanced epidemiologic methods. The department excels in research, education, and service covering the entire life-course for health outcomes in diverse populations, particularly focusing on critical windows of development (i.e., during and after pregnancy and during childhood and young adulthood). There are 19 primary faculty and more than 25 additional faculty associated with the Department of Epidemiology at the Brown School of Public Health. The faculty are world-renowned researchers whose expertise include cancer, environmental health, global health, mental health, infectious disease, maternal and child health, molecular, health disparities, obesity, substance use, mindfulness, and epidemiologic methods. The Department also collaborates with faculty in social sciences, basic biomedical sciences, and clinical departments at Alpert Medical School and its affiliated hospitals (e.g., Cardiology, Endocrinology, Obstetrics/Gynecology, Pediatrics, and Psychiatry). The department includes faculty engaged full-time in research and teaching, as well as importantly clinical faculty and faculty members jointly appointed with Brown University and the Rhode Island Health Department.

The Department of Health Services, Policy & Practice (HSPP) includes 25 full-time faculty based at 121 South Main Street in Providence, 73 faculty from other Brown University Departments that have secondary appointments and other affiliated faculty. The Department’s mission is to develop and disseminate new knowledge that helps to deliver effective, efficient, continuously-improving and just public health and health care services. This is accomplished through innovative research, engaged teaching, creative training and mentoring and collaborative engagement with policy makers and service providers. The Department values innovation, creativity, promotion of diversity, multidisciplinary collaboration, community engagement, and excellence. The long term goal is to catalyze the delivery of higher quality and more cost-effective public health and health care services.

The Department has developed relationships with a wide variety of partners and collaborators. Within Brown University these include the Departments of Medicine, Surgery, Psychiatry and OB/Gyn at the Medical School, and the Departments of Economics, Sociology and Computer Science on campus. The Department has a strong and long-standing relationship with the Providence Veteran’s Administration (VA) Hospital. In addition, the department has relationships with a number of important Rhode Island state agencies including the Department of Health, the Executive Office of Health and Human Services (EOHHS) and the RI Medicaid
Program. These and other partners and collaborators allow faculty and trainees to participate in multidisciplinary collaboration in a variety of academic and policy setting.

**School of Engineering:** Brown Engineering is a unique place, which emphasizes the power of interdisciplinary thought and recognizes that engineering is intertwined with every aspect of human lives. The School is organized without the traditional departments or boundaries found at most schools; the School’s model is focused on making unique connections between the various engineering disciplines. Along with associations with the other scholarly disciplines – biology, medicine, physics, chemistry, computer science, the humanities and the social sciences – Engineering’s co-operations bring unique solutions to challenging problems. The School focuses on unique and innovative clustering of faculty; in terms of research groups, engineers of all types team together with non-engineers to tackle some of the biggest problems facing engineering and science today. The School’s talents and expertise lie in the interdisciplinary domain where the seemingly diverse disciplines converge. Because of a unique structure and approach to engineering, for example, the lack of formal boundaries between engineering disciplines, research is highly interdisciplinary and often includes connections to other departments on campus outside of the School. In keeping with an interdisciplinary nature, the School of Engineering has no traditional departments and Brown does not award degrees based by specific research area. Areas of study in engineering include: Biomedical Engineering; Chemical and Biochemical Engineering; Electrical Sciences and Computer Engineering; Fluids and Thermal Sciences; Materials Science; Mechanics of Solids; Program in Innovation Management and Entrepreneurship (PRIME) (Master's only) and Executive Master in Science and Technology Leadership (EMSTL).

**Applied Mathematics:** The Division of Applied Mathematics is one of the most prominent departments at Brown, and one of the oldest and strongest of its type in the entire country. The Division had its origin in the program of Advanced Instruction and Research in Mechanics, established in 1941 on the recommendation of a committee of the National Research Council. This early program focused on solid and fluid mechanics, electromagnetic theory, mathematical methods in applied physics, numerical analysis and probability theory—the principal interests of the faculty for many years. Since then the interests of the faculty have expanded and diversified, as the Division has maintained a leading role in the development of applied mathematics both in the United States and throughout the world. In 1964, for example, the Center for Dynamical Systems was established to coordinate the research of a large group of people working in ordinary and partial differential equations and their applications. More recently, programs at the forefront of research in scientific computing and in applied probability and statistics have been established.

The Division’s mission rests in research, education, and scholarship. The faculty engages in research in a range of areas from applied and algorithmic problems to the study of fundamental mathematical questions. By its nature, the Division’s work is and always has been inter- and multidisciplinary. Among the research areas represented in the Division are dynamical systems and partial differential equations, control theory, probability and stochastic processes, numerical analysis and scientific computing, fluid mechanics, computational molecular biology, statistics, and pattern theory. The graduate program in applied mathematics includes around 50 Ph.D. students, with many of them working on interdisciplinary projects. Applied Math offers undergraduate degrees in Applied Mathematics, Applied Math–Biology, Applied Math–Computer Science, and Applied Math–Economics. The faculty actively involve undergraduates in summer research projects and offer many independent studies every year.

**Computer Science:** Since its inception in 1979, the Computer Science Department at Brown has forged a path of innovative information technology research and teaching at both the undergraduate and graduate levels. From modest beginnings as an interest group within the Divisions of Applied Mathematics and Engineering in the 1960s to its current stature as one of the nation's leading computer science programs, the Computer Science Department has continuously produced prominent contributors in the field, at both the undergraduate and graduate levels. The Department is a diverse community of scholars engaged in all aspects of research, teaching and mentoring in computer science and its related interdisciplinary disciplines. Realizing the importance of computing and algorithmic thinking in so many scientific, social and technological endeavors, the faculty collaborate extensively with colleagues in archaeology, applied mathematics, biology, cognitive and linguistic sciences, economics, engineering, mathematics, medicine, physics and neuroscience.

Computer Science undergraduate offerings reflect the department's multidisciplinary orientations, with joint concentrations in mathematics, applied mathematics, computational biology and economics. There are strong
undergraduate research groups in graphics, neuroscience and robotics as well as a long history of involving undergraduates in projects that span disciplinary boundaries. Graduate students find it easy to tailor their education to meet the challenges of multidisciplinary research and commonly have advisors in two or more departments.

Research in the department crosses traditional boundaries and projects spring from shared interests more than from established groups. Faculty work with post-doctoral students, graduate students and undergraduates with ideas and expertise are drawn from other disciplines and departments at the University. A long tradition of combining theory and practice is as strong and relevant today as it ever was. Research areas the department participates in include: algorithms; cloud computing; computational biology; computational geometry; computational neuroscience; computational photography; computer graphics; computer networks; computer vision; cryptography; data management; distributed systems; educational technology; electronic commerce; information visualization; intelligent agents; machine learning; mobile and ubiquitous computing; nanocomputing; natural language processing; operating systems; optimization; parallel computing; programming languages; robotics; scientific visualization and modeling; security and privacy; sensor networks; software engineering; user interfaces; theory of computation; verification and reliable systems; virtual reality.

BROWN GRADUATE PROGRAMS

Brown University's Graduate School offers 51 doctoral programs and 31 master’s programs, including those of the School of Engineering, the School of Public Health, and the School of Professional Studies.
Brown has a friendly scale and collaborative culture. With 2,200 graduate students and more than 700 full-time faculty members, Brown offers excellent academic training and mentoring within a supportive environment. Graduate students may choose from a range of development opportunities, including:
1. Open Graduate Education program, providing flexibility for select doctoral students to define their academic journey and earn a secondary master's degree of their choosing.
2. Doctoral certificates as well as Sheridan Center for Teaching and Learning certificates.
3. Global Mobility grants and Graduate School travel research funds, supporting graduate student scholarship.
4. Deans’ Faculty Fellowship Program, enabling advanced doctoral students to strengthen their teaching portfolios.
5. Interdisciplinary Opportunities for advanced doctoral students, allowing engagement in scholarly life at participating Centers and Institutes.
6. Both the Brown-Wheaton Faculty Fellowships and the Brown-Tougaloo Faculty Fellowships provide advanced teaching opportunities at a liberal arts and a rural college, respectively.
7. Brown Executive Scholars Training Program, preparing advanced master’s students and doctoral candidates for careers in higher education administration.

Biology and Medicine Graduate Programs

Biomedical Engineering creates new knowledge and improves human health through cross-disciplinary research and educational activities that integrate the engineering and physical sciences with the life sciences and clinical practice.

Biotechnology studies a range of topics related to the field of biotechnology such as regenerative medicine, drug delivery, stem cells, nerve guidance, and drug discovery. Conducts translational research, from conceptual design through in vivo testing with an eye toward clinical implementation.

Computational Biology seeks to make breakthrough discoveries in the life sciences through the development and application of novel computational, mathematical, and statistical techniques. Research aims to exploit opportunities emerging from rapid technological advances in genomics and proteomics.

Ecology & Evolutionary Biology seeks to understand biological patterns and processes ranging from DNA to dinosaurs, using integrative approaches with genetic models, phylogenetics and biogeography, functional analyses of whole organisms, and the dynamics and conservation of natural ecosystems.

Molecular Pharmacology & Physiology studies the underlying mechanisms of basic physiological processes, their structural components, and how drugs affect these processes to develop cures for diseases.

Molecular Biology, Cell Biology, and Biochemistry studies cellular, molecular, and biochemical mechanisms of biological processes in development, growth, and disease.

Neuroscience unites experimental and theoretical scientists who study the molecules, cells, and networks of the brain to advance understanding of nervous system function, disease, and treatment. Pathobiology
Uncovers mechanisms of disease initiation, progression and resolution by working in the areas of immunology & infectious disease; toxicology & environmental pathology; and cancer biology.

**Brown Graduate Programs in Public Health**

- **Biostatistics** Trains students to develop theory and methods for study design, data analysis, and statistical inference; and to apply the methods to address research questions in public health, biology, medicine, and social sciences.

- **Behavioral and Social Health Sciences** Uses behavioral and social science theory and methods to understand contemporary health problems such as obesity, drug & alcohol abuse, smoking, and HIV risk behaviors.

- **Epidemiology Studies** the distribution and determinants of disease in populations to generate new discoveries regarding disease causation and to develop community and individual based preventive activities.

- **Health Services Research** Analyzes the organization, policies, and economic forces affecting health care delivery systems, providers, and consumers with the goal of improving services and influencing policy to create more equitable health outcomes.

**Brown Program in Innovation, Management and Entrepreneurship (PRIME).** The PRIME Program in the School of Engineering is intended to introduce students from an engineering or science discipline to the workings of technology startup companies (and to the technology innovation process in larger firms), and to provide enough background so that the student can be effective in such an environment. PRIME students earn an ScM degree, a Masters of Science. Students from other PhD programs at Brown can earn a PRIME Master's degree alongside their program's PhD.

**Brown School of Professional Studies:** The School of Professional Studies advances Brown University’s commitment to executive education and its mission to develop reflective leaders, to effect change in the world, and to improve human welfare. The School offers outstanding educational programs for executives and professionals who are ready for the challenge.

- **IE Brown Executive MBA** - Learn to lead in the complex, global business environment by integrating core business studies with social sciences and humanities. Expand your impact and influence by understanding the context for success and honing your leadership skills.

- **Executive Master of Healthcare Leadership** - Prepare to transform healthcare policy and delivery with clinicians, executives, advocates, payers and other professionals who will design and implement innovative, sustainable solutions across healthcare.

- **Executive Master in Cybersecurity** - Become a transformative cybersecurity leader in this rapidly evolving field by understanding and applying technical, legal, policy and human factors essential for resilient, secure organizations.

- **Executive Master in Science and Technology Leadership** - Build on your technical expertise and develop leadership and communication skills with leading professors and accomplished practitioners from science, technology and engineering. Become a strategic industry leader who sources and drives innovation on a global scale.

**BROWN ACADEMIC RESOURCES FOR FACULTY, TRAINEES AND SCHOLARS**

**Academic Support Services for Graduate Students in the Division of Biology and Medicine.** Training faculty in general have primary appointments in the Division of Biology and Medicine, in the University at-large, and in clinical departments. The Division's Graduate Program is administered by the Associate Dean of Graduate and Postdoctoral Studies. All predoctoral students offered admission to graduate programs are guaranteed five years of financial support contingent upon making satisfactory progress toward the PhD degree. This support includes stipend, health insurance, and remission of tuition and fees. Support comes from a combination of resources including Division Fellowships, BIBS fellowships, Predoctoral Training Grants, Research Grants, Institutional Start-up Funds, Teaching Assistantships and Individual Fellowships. About 25% of PhD students currently receive support from faculty generated research grants. A criteria of eligibility for more senior faculty to serve as a research mentor is available or pending external research funding.
Office of Graduate and Postdoctoral Studies within the Division of Biology and Medicine. Created in January 2006, the office focuses on and enhancing the training environment for the ~250 graduate students and 100 postdocs within the Division of Biology and Medicine. In creating this office, the Dean of Medicine and Biological Sciences committed to growth in the overall number of trainees and to increase the diversity of this group while enriching trainee preparation as scholars within the university setting and in their future career paths. The Associate Dean for Graduate and Postdoctoral Studies oversees admissions, recruitment, tracking, support, and professional development for students in all graduate programs. Graduate Programs within the Division of Biology and Medicine are primarily interdepartmental in structure. Pre-doctoral students benefit from this multidisciplinary training environment and strong extramural research-funding base. Each Division Graduate Program has its own administrative offices, support staff, and dedicated space for students along with computer and internet access nearby faculty research laboratories. There are further student computer clusters and associated hardware (printers and scanners) and fully supported software at the Libraries and CIT (Computing Information Technology) center. Each student is assigned office space or desk space.

BioMed Faculty Administration supports more than 2,000 faculty in the Division of Biology and Medicine in their teaching, research, clinical, and administrative roles. BMFA facilitates the recruitment, appointment, retention, and promotion of faculty members across six campus-based departments and 14 clinical departments in seven hospitals. BMFA sponsors educational and mentoring programs such as grant writing, promotion, and peer mentoring workshops. BMFA manages faculty data and provides reporting to both internal partners and external organizations and works collaboratively to insure that BioMed's policies and practices are consistent with University goals.

Responsible Conduct of Research (RCR) Training in the Division of Biology and Medicine: All first-year graduate students in the Division are required to successfully complete “The Ethics of Responsible Conduct in Research”. It is also recommended that newly hired postdoctoral trainees participate in this training. This seven-week introduction to the scope and complexity of ethical situations that confront modern biologists is led by the Division's Associate Dean for Graduate and Postdoctoral Studies and taught by BioMed Division faculty. This training covers multiple topics including: i) the context and history of ethical research practices within scholarship; ii) the peer review process and its purpose; iii) data acquisition, storage, and privacy; iv) legal and ethical considerations in animal research; v) publication practices and responsible authorship; vi) practical and ethical issues in human-subjects research; vii) the mentoring relationship and associated responsibilities of mentors and trainees; viii) recognizing and navigating conflicts of interest and research misconduct; ix) the mentoring relationship and associated responsibilities of mentors and trainees; xi) individual development plans (IDP); and xii) rigor and reproducibility of data. Discussion of the ethics of diversity is incorporated throughout to convey an appreciation for the fact that differences of race, culture, age, gender, (dis)ability, and religion can affect the conduct and interpretation of research. The training includes presentations, short illustrative films specific to biomedical research issues, and small group discussion of hypothetical and real scenarios drawn from current literature and news media. Division faculty and University staff participate as presenters and discussants along with students. The emphasis is on dialog and the contextualization of ethical decision making in the biological sciences.

RCR training is conducted at the start of the academic year so that students are able to incorporate this important information into their coursework and early research experiences. To successfully complete the course, students must participate in all sessions, complete homework assignments, and score 75% or better on the final examination. Students receive certificates of completion and their Graduate Program Directors are notified. Students who do not successfully complete training must fulfill additional RCR assignments. This required introductory Division-wide training is a starting point for ongoing instruction by individual graduate programs and faculty mentors, who are urged to stimulate dialogue regarding ethical conduct in science as relevant situations arise in research projects or the laboratory.

BioMed RCR Refresher Course: Brown University offers refresher training for postdoctoral researchers and fourth-year predoctoral students in the Division of Biology and Medicine that satisfies the National Institutes of Health (NIH) and National Science Foundation (NSF) requirements for the Responsible Conduct of Research (RCR). The course comprises three in-person sessions lasting 1.5h each and is offered twice per academic year, once during the fall semester and once during the spring semester. To complete refresher
training, trainees may attend all three sessions of a cycle or participate in two sessions and complete online Collaborative Institutional Training Initiative (CITI) training. Each session begins with a brief introduction of the topic by the instructor. Trainees are then divided into small groups and instructed to review and discuss a relevant case study, or to debate open-ended thought questions. Next, trainees describe their assigned case or question(s) to the entire group and summarize their discussion and the topic is debated among the entire class.

**Brown Ethics and Responsible Conduct of Research (BEARCORE):** The BEARCORE program is designed to educate young researchers and trainees from a variety of academic fields on how to conduct their scientific investigations responsibly and with integrity. BEARCORE is an eight hour; in-person training that is supplemented by on-line instruction through the Collaborative Institutional Training Initiative (CITI). It is held each spring and fulfills NIH and NSF requirements. Classes are taught by faculty members and OVPR subject matter experts. Topics include conflicts of interest, human subjects and animal research, safe laboratory practices, mentor/mentee responsibilities and relationships, collaborative research & export controls, peer review, data acquisition and laboratory tools, research misconduct, responsible authorship and publication, the scientist as a responsible member of society, fiscal responsibility in sponsored research.

While BEARCORE is used primarily by trainees and new researchers to fulfill NIH and NSF RCR requirements, it is open to anyone in the Brown community. In sessions where spaces are limited, enrollment preference will be given to NIH/NSF trainees. Course requirements for researchers and trainees with NIH and NSF grants include attendance of all in-person sessions/lectures, participation in class discussions, and completion of pre-work and homework assignments.

**BEARCORE Refresher Course:** The NIH requires that RCR training be completed at least once during each career stage (i.e., undergraduate, graduate, postdoctoral, and faculty levels), and at a frequency of no less than once every four years. NSF defers to each institution to determine the frequency of RCR training for its NSF-supported trainees, and Brown encourages NSF trainees to follow the same training frequency requirements as those enforced by NIH. Once an individual completes the face-to-face course of instruction with a minimum of eight contact hours to satisfy the initial RCR training requirement, they may then complete refresher courses to comply with the career stage requirement and/or the requirement to complete re-training no less than once every four years. To complete the BEARCORE Refresher Course, the individual may attend three in-person BEARCORE sessions of your choosing during the spring course offering OR participate in two BEARCORE sessions and complete online Collaborative Institutional Training Initiative (CITI) training.

**RCR Programming across fields:** While training courses fulfill the necessity of focusing on discipline-specific ethical issues, Brown University feels that it is critical to bring students of all disciplines into dialogue with each other about ethics as an academy-wide aspect of graduate education. This interdisciplinary programming places the ethics of biological research in a larger context. The Academy in Context series sponsored by the Graduate School and the Office of Student Life (http://www.brown.edu/academics/gradschool/academy-context) brings graduate students and faculty from across the University together to discuss ethical issues with faculty speakers and outside experts. The focus on ethics has allowed us to invite speakers on a very wide range of topics—from the way computer technology is altering human bodies, or the intersections between governmental policymaking and the scientific community, to the ethical dimensions of negotiating ownership of the past in archaeological excavations. The large dinner-seminar is complemented by smaller group discussions that focus on specific ethical applications. These workshops synthesize questions, identify other readings on the topic, and make suggestions for aspects that can be woven into the curriculum of courses across the campus. Rather than being divided along disciplinary lines, participants are part of teams that include engineers, humanists, social scientists, and physical scientists. They not only learn about the issues, but they also see how people with different backgrounds think about the issues.

**Sheridan Center for Advanced Teaching and Learning,** directed by Dr. Mary Wright, is a place where faculty, graduate students and postdocs come together from across the disciplines to inquire about, explore, and reflect upon teaching and learning as ongoing and collaborative processes. Sheridan Center programs,
services and resources are available to all members of the Brown community, including full-time and part-time faculty, postdoctoral fellows, teaching fellows, and teaching assistants. The Sheridan Center provides practical advice about teaching and professional development and promotes best practices and promising new practices in teaching. Programs offered include Teaching – orientations, workshops, and lectures; Course Development Grants – support to develop experimental modules or new courses that pursue creative approaches to teaching and learning; Certificate Programs – five year-long certificate programs on teaching practice and preparation for professional careers; Confidential Consulting Services – course and syllabus consultations, classroom observations, student evaluation consultations, practice teaching sessions; Support for Research – effective presentations, educational components of grants, program evaluations, scholarship on teaching and learning; Career Planning – programs and resources to help launch and develop professional careers; Teaching and Learning Resources – publications and online resources addressing a wide range of topics; Community – programs and initiatives bringing together faculty, graduate students, and postdocs from across the disciplines. Advanced T32 students use this center to work toward various teaching certificates. Graduate students can move through to Certificate IV which is the teaching consultant program. There is a graduate student liaison to the Teaching Center. The Sheridan Center resources are especially valuable to students interested in future careers that involve college level teaching.

Digital Teaching and Learning: Brown University has made significant strides in expanding its reach into the realms of digitally enabled and supported teaching and learning. Guidance and support for current and future experimentation by faculty in new modes of education come from the Dean of the College, Sheridan Center, School of Professional Studies, Computing and Information Services, University Library, Office of the Provost, and faculty members. Representatives from these offices comprise the Provost’s Steering Committee for Digital Teaching and Learning, charged to assist the Provost in articulating an overarching vision and putting into action a progressive plan for supporting digital education at Brown, and ensuring that the associated efforts align with the University’s mission, values, and operational requirements.

The Online Instructional Design Resources. The Online Team at Brown’s School of Professional Studies (SPS) is responsible for the design, development, delivery, and facilitation of online and blended courses within three program areas at SPS: Executive and Professional, Undergraduate, and Pre-College. The team also collaborates with colleagues across Brown’s campus and at other peer institutions to advance online teaching and learning initiatives. The Team believes that effective learning depends on high-quality instructional design – no matter whether in a traditional face-to-face classroom or in an online environment. Brown’s online instructors are enthusiastic, imaginative educators working at the forefront of online teaching and learning. They work closely with the University’s instructional designers to develop and facilitate courses that exemplify best practices of student-centered design and inquiry-based learning. The courses foster exciting, dynamic learning communities that encourage one-on-one interaction, teamwork, and networking.

The Effective Performance Workshop Series for graduate students is designed to introduce students to performance values, drawn from improvisational and theatrical techniques. Guided by professional actors, participants are given the opportunity to explore in a fun and interactive setting how to engage their bodies, voices, and passions to communicate in compelling ways. The workshop will also offer an opportunity for participants to build connections with students in other programs. Working together in a spirit of collaboration and open exchange, students will work on developing skills in enhancing presence, active listening and storytelling, and responding dynamically to an audience. Participants should wear comfortable clothes and be ready to move and play.

Professional Development: Career development workshops and seminar offerings are widely available at Brown, its affiliated hospitals and other academic institutions across the state. Some of these programs are specifically offered through programs with missions to increase the retention and advancement of women faculty in science and engineering or to advance the academic progress and professional development of women faculty through education, advocacy, mentoring and networking. All of these programs are open to interested participants regardless of institutional affiliation, job title or gender. Most instructor led programs are advertised through Brown’s online LearningPoint Professional Development System. This online tool provides a single point of access to instructor-led training registration and administration, e-learning delivery and more for professional development and compliance purposes. It allows an individual to register for training and also maintains a

Lynda.com Online Learning is a leading online learning resource platform that helps anyone learn business, software, technology and creative skills to achieve personal and professional goals. Through Brown’s Lynda.com subscription, students, staff, and Brown-Paid faculty have unlimited access to the Lynda.com video library of engaging, top-quality courses taught by recognized industry experts.

Wellness At Brown! offers a selection of wellness programs focused on the prevention and intervention of health risk factors. Programs are offered through on-site classes, online management tools, self-directed programs and individualized consultations with an emphasis on encouraging employees to lead a healthy lifestyle while at work and at home.

The Writing Center is an academic support service, staffed by graduate students from a variety of academic disciplines, available for all members of the Brown Community. Staff members are experienced writers and teachers who participate in ongoing training in composition theory and practice. Along with holding one-on-one conferences, Associates in the Writing Center offer various workshops on writing for interested groups. Writing Center conferences generally last an hour. Writing Center Associates are prepared to discuss all stages of the writing process, from finding a topic up through revision and editing strategies. Associates can help writers deal with writer's block, audience awareness, argumentation, organization, grammar, research skills, the conventions of academic writing.

CareerLAB assists graduate students with their professional development, including career exploration as well as job search skills, CV and resume development, cover letter development and interview preparation. Confidential career advising sessions are available with trained advisors familiar with graduate student career issues in both academic and non-academic career fields.

The Office of Career Development at the Alpert Medical School is available to help with the decision making process including arranging for shadowing experiences, navigating the transition from preclinical to the clinical years, and developing personalized fourth year schedules. The Career Development office provides guidance with the residency application process, assisting with the development of a robust curriculum vitae, personal statement and strong residency applications. The department also offers opportunities to participate in mock interviews to help students prepare for the residency interview trail.

BioMed Computer Services Office: In addition to the Brown campus-wide resources of the Computing and Information Services Department (CIS), the Biomed Computer Services Office supports instructional, administrative, and research technology needs for both campus and hospital-based faculty and staff. The office assists with trouble-shooting computer problems, installation of software and hardware, computer configuration management, the purchase of new equipment, network planning and configuration, application and website development, and all Division information technology management and planning.

BROWN COLLABORATION RESOURCES

Brown Collaboration Spaces: The University has several state-of-the-art facilities to support the development collaborations and teaching approaches that leverage the latest in technology. Notable facilities, which would be available for the proposed Hackathon event, include:

Multimedia Labs: The Multimedia Labs are multi-computer teaching facilities dedicated to integrating creative technology with teaching and learning, featuring animation stations, scanners, MIDI keyboards, and pen-tablet displays. They provide software, equipment and support to produce web, software development, graphics, video, animation, 3D fabrication and sound.

Lecture Capture, Panopto: Lecture capture allows you to record your lectures in specified classrooms. Panopto software can also be used on your own computer or mobile device to create videos for courses.
Panopto has high-quality video and a great mobile app for viewing videos on smartphones and tablets. Panopto will be launching in June.

**Digital Scholarship Lab (DSL):** The DSL is a digital space in the Brown Rockefeller library, designed specifically for collaboration, flexibility, and ease of use for scholars working on data-rich and visually-mediated research. It offers a collaborative, flexible, and easy-to-use space for digital projects and allows access to large LED display with multiple inputs for presenting data-rich and visually-mediated research. The lab features:

- **A 7×16-foot display wall:** One side of the lab is occupied by a beautiful large-scale, high-resolution video wall comprised of twelve 55-inch high-resolution LED screens. The total size is 7,680 pixels across by 3,240 pixels down for a total of over 24 million pixels. This display is perfect for viewing high resolution images in detail, or viewing many images side-by-side for comparison.
- **Multiple video inputs:** There are 14 video inputs throughout the room. Anywhere between one and 12 of those inputs can be displayed on the wall simultaneously, in a variety of configurations. Being able to easily change the layout of the wall means that the room is conducive to a variety of presentation styles, and that one can seamlessly move between modes of use: from a single input for presenting one person’s work to an audience, to 2 inputs for visual comparison, or many more inputs to collectively and collaboratively look at a team’s work.
- **Portable touch-enabled 50-inch monitors:** two large portable monitors on carts that can be moved around the room. The portable monitors allow for small-group breakouts.
- **Videoconferencing:** The lab contains two high-definition wall-mounted cameras that can be panned and zoomed by remote control. The DSL has full videoconferencing capabilities for bringing in remote speakers or teleconferencing.
- **Completely reconfigurable furniture:** The lab is equipped with seating and tables, and all furniture is on wheels. Table seating accommodates up to 20, with additional seating for up to 45. The DSL can be converted from a lecture hall to a team project room to a seminar room within minutes.

**Rockefeller Digital Studio:** The Sidney E. Frank Digital Studio provides a unique and exciting intellectual hub for digitally enhanced scholarship at Brown University. The Digital Studio facilitates both short-term and extended engagements with academic questions that benefit from the infusion of technology and new methodologies in research and learning. This 4,500-square-foot space in the Rockefeller Library welcomes scholars at all levels into conversations and result-driven actions, whether they have come to consult on the content and design of digital projects, model or analyze data, create prototyped or finished multimedia presentations, learn a new tool, or explore the integration of traditional resources into novel forms of research and scholarship. Expert staff from Center for Digital Scholarship and around the Library assists students and researchers across the disciplines in digital imaging, iterative project design and implementation, copyright and fair use, data curation and management, archiving and repository services, digital scholarship methodologies and practices, as well as the delivery and dissemination of digital content.

**Multimedia Labs:** The Multimedia Labs are multi-computer teaching facilities dedicated to integrating creative technology with teaching and learning, featuring animation stations, scanners, MIDI keyboards, and pen-tablet displays. They provide software, equipment and support to produce web, software development, graphics, video, animation, 3D fabrication and sound.

**Humanity Centered Robotics Initiative Lab (HCRI):** The HCRI unites Brown University faculty and students across numerous departments and schools who are dedicated to robotics as an innovative and societally beneficial technology. Common commitments include (1) identifying societal needs that robots can help fulfill; (2) advancing science and technology of robots that fulfill these needs; and (3) studying and integrating into design the societal impact of robotic technologies, with a goal of averting labor replacement and privileged access to technology. The first space is the newly opened 8th floor of the Sciences Library, which houses the Human Robot Interaction testing area with a motion capture and camera tracking system, a robot build area in the Internet of Things Lab, and numerous breakout tables to be used for student classes and hackathons.
ITG Teaching Lab: The Instructional Technology Group’s Teaching Lab allows instructors to investigate new technologies & teaching strategies with reconfigurable space, writable walls, wireless projectors, class recording and help from ITG. It is designed to investigate how instructional space and new technologies interact with teaching and learning strategies. The space offers dry-erase wall surfaces, multiple wireless projectors, touch-screen tablet computers for instructors, and class recording/web conferencing capabilities. Both wireless projectors display directly onto writable walls so the instructor can annotate digital presentations with dry-erase markers. Wireless digital annotation of presentations is also supported.

CAVE: The Brown University Center for Computation and Visualization’s (CCV) original fully immersive display system, called the Cave, is an 8' cube with projected images on the front, left and right walls, as well as the floor. CrystalEyes LCD-shutter glasses provide stereo depth-perception, and a variety of Intersense and Polhemus tracking devices allow software to track the position of a user's hand, head, wand, etc. The CAVE also has a multi-speaker sound system that provides positional audio. Some existing software that can be used in the system currently include volume visualization, molecular visualization, and simple 3d model manipulation. New projects can be initiated through consultation with CCV visualization staff.

YURT: CCV’s state of the art virtual reality theater displays over 100 million stereo pixels and consists of 69 full HD projectors driven by 20 nodes of the CCV HPC cluster. The projectors display onto 145 mirrors covering a 360-degree surface including overhead and underfoot. At normal viewing distances, the pixels are smaller than are resolvable by the human retina. The screen consists of translucent polycarbonate. The front wall is 25 feet long and 8 feet high and spans 180 degrees of view. The screens are suspended, along with half of the projectors, from an aluminum superstructure, with a catwalk for maintenance. The blending and warping that create one image from many projectors is proprietary, from the Scalable Display company, but this library has been licensed to be incorporated into many different applications and software libraries. Many of the applications that run in the YURT use vrg3d, a virtual reality graphics package developed and maintained in the Computer Science department. Other scientific and analysis packages have already been successfully incorporated into the YURT, including Blender, a popular open-source 3D modeling game engine, and Paraview, a widely-used scientific graphics and analysis package.

BROWN DIVERSITY INITIATIVES

University is engaged in the work of creating a more diverse and inclusive academic community, as evidenced by “Pathways to Diversity and Inclusion: An Action Plan for Brown University”. This plan formalizes and expands upon diversity and inclusion efforts articulated in Brown’s Building on Distinction strategic plan. The Graduate School is represented on the Diversity and Inclusion Action Plan (DIAP) Implementation Working Group.

The Office of Institutional Diversity and Inclusion (OIDI): The Office of Institutional Diversity and Inclusion (OIDI) serves as a critical leader, resource and support in promoting and sustaining more inclusive and diverse learning and working environments at all levels at Brown. OIDI supports Brown’s goals related to equal opportunity, diversity and inclusion through:

**Compliance:** OIDI oversees compliance with University policies and procedures and with federal, state and local laws related to discrimination and harassment (Title VI), sexual and gender-based harassment and violence (Title IX), equal employment opportunity and affirmative action (EEO/AA), and disabilities resources and accommodations (ADA).

**Accountability:** OIDI monitors and measures progress of Brown University’s Diversity and Inclusion Action Plan (DIAP) and the Departmental DIAPs, produces an Annual Report for the DIAP, and supports the activities of the Diversity and Inclusion Oversight Board and the President’s Advisory Council on Diversity.

**Fostering Academic Diversity:** OIDI supports academic and administrative units with their efforts to recruit a diverse faculty and staff by providing training and assistance to search committees as they develop diverse pools of candidates. OIDI also supports the development, implementation and assessment of professional development and mentoring initiatives for faculty, staff and students from historically underrepresented groups.

**Promoting Diversity and Inclusion:** OIDI collaborates with offices across Brown to design, implement and promote programs and events related to diversity and inclusion.
Graduate School Diversity Commitment: The Graduate School is committed to fostering a welcoming and inclusive academic community and educating and training a distinguished and diverse cohort of master’s and doctoral students, as well as postdoctoral researchers. Exposure to a broad range of perspectives, views, and outlooks is key to fostering both breadth and depth in intellectual knowledge. At Brown, the term “diversity” is used in the broadest sense to encompass many things such as race, color, religion, age, national and ethnicity origin, disability, status as a veteran, language, socio-economic background, sex, sexual orientation, gender identity, gender expression, political ideology, theoretical approach, and the list can go on. It is through the interaction among individuals from a diverse set of experiences, histories, and backgrounds that true intellectual diversity is achieved. The University's Office of Institutional Diversity and Inclusion provides leadership for the formulation and oversight of University policies related to pluralism and equity, and initiates programs and practices that promote diversity, inclusion, and fair treatment of all members of the community. The University designates officers who are responsible for issues of compliance and who are available to answer questions and provide advice.

Recruiting and Admission: The Graduate School actively recruits students who are and have been traditionally underrepresented in graduate education, including but not limited to underrepresented racial and ethnic minorities, women, and people with disabilities. The associate dean for diversity initiatives works in partnership with individual departments and programs at Brown and cultivates relationships with Historically Black Colleges and Universities (HBCUs) and other Minority Serving Institutions (MSIs). The Graduate School works closely with the Leadership Alliance to identify potential graduate program applicants among the pool of undergraduate students who are conducting research at Brown for eight weeks during the summer. Similarly, the Graduate School works in close partnership with students from Tougaloo College who spend time at Brown throughout the year while participating in various aspects of Brown-Tougaloo Partnership programming. The Graduate School also recruits at various annual meetings and conferences around the country.

Every spring, the Graduate School invites newly admitted underrepresented minority students to attend a one-day campus visit called “Super Monday.” Throughout the day, students are exposed to various aspects of graduate student life at Brown through interaction with faculty, staff and students from their prospective departments, deans of the Graduate School, and representatives from various centers and offices on campus. The day ends with a reception and dinner, which is attended by matriculating graduate students, faculty, and staff of color from across the campus. The Graduate School covers the costs associated with prospective students’ transportation to and from Providence and overnight accommodations for this event.

Retention and Advancement: The Graduate School sponsors Multicultural Graduate Student (MGS) events for underrepresented minority students, including dinners with invited guest speakers, academic achievement and cultural celebrations, and social-networking activities. The Graduate School provides assistance to a variety of student associations and clubs that represent Brown’s diverse graduate student population. In addition, the University offers individual and group support to students who identify as Lesbian, Gay, Bisexual, Transgender, and Queer/Questioning (LGBTQ).

Program Review: Diversity is one of several criteria used by the Graduate School to assess the performance of graduate programs.

Brown University Initiative to Maximize Student Development (IMSD): Brown University is dedicated to ensuring a diverse and inclusive scholarly community. Brown’s IMSD is a research training initiative funded by a grant R25GM083270 from the National Institute of General Medical Sciences of the National Institutes of Health from April 2008 – March 2022. The program has significantly increased the diversity of doctoral students in the life sciences and supported enhanced academic achievement among the students it serves. This recently renewed $3.3 million award will extend IMSD’s reach to the physical sciences, engineering and mathematics departments. The program will now support up to 20 doctoral students a year in 21 programs instead of just eight students in the Division of Biology and Medicine and the School of Public Health. The goal of the IMSD is to increase the number of underrepresented students who complete PhD degrees in biomedical research. Participants are identified from matriculants in the PhD Programs. Participants receive a generous 12-month stipend and benefits, full tuition, health insurance and health fee. In addition, trainees are eligible to receive travel funding support to present their research at scientific meetings.
The program strives for Excellence, Community and Collaboration. IMSD provides a personalized, multidimensional training experience that features 1) Continuous-to-degree advising, 2) Cutting edge research experience 3) Skill-based training modules to complement curriculum 4) Strong peer network and mentoring 5) Professional development and career planning. IMSD Workshop topics include: "Demystifying the PhD Experience: Strategies for Academic & Personal Success in Graduate School"; "Reading Scientific Publications"; "Managing and Sharing Your Research Data"; "Essential Laboratory Calculations"; "Navigating a Successful Graduate Career: Professionalism & Etiquette"; "Professionalism & Career Development: Preparing for the Postdoc Experience"; "Graphic Presentation of Scientific Data"; "Beyond the Hypothesis: Experimental Design and Critical Analysis"; "Designing and Delivering Scientific Presentations"; "Defending Your Research Proposal and Critiquing Those of Others"; "Resources, Tools and Basic Techniques in Molecular Biology"; "Scientific Writing: Key Principles"; and "Introduction to Statistical Analysis of Data".

**Student Diversity Groups:** Student groups include the Samuel M. Nabrit Black Graduate Student Association, Graduate Women in Science and Engineering (GWiSE), the Brown Tango Club, the Brown chapter of SACNAS, which stands for the Society for the Advancement of Chicano and Native Americans in Science, the Graduate Students of Color Collective, and the Graduate Biomedical Engineering Society.

**BROWN CENTERS, INSTITUTES, INITIATIVES AND PROGRAMS**

**Institute for Computational and Experimental Research in Mathematics (ICERM):** The Institute for Computational and Experimental Research in Mathematics (ICERM) was founded in 2010 through a major grant to Brown University from the National Science Foundation, Division of Mathematical Sciences. The mission of ICERM is to support and broaden the relationship between mathematics and computation: specifically, to expand the use of computational and experimental methods in mathematics, to support theoretical advances related to computation, and address problems posed by the existence and use of the computer through mathematical tools, research and innovation. ICERM supports its mission by developing and hosting research programs and activities that 1) Encourage the creation of new computational methods to advance mathematical understanding, 2) Foster a deeper understanding of algorithms and computational tools, 3) Expose program participants to the use of simulation, visualization, experiments, or computer-assisted proofs, 4) Catalyze new directions of mathematical research through synergistic collaborations across disciplinary areas and research communities, 4) Advance the training and mentoring of graduate students and early-career postdoctoral researchers through exposure to new mathematical areas and computational methods. The institute benefits from its strong ties to the mathematical sciences departments at Brown, and from the vibrant educational community of colleges and universities across New England.

**The Hassenfeld Child Health Innovation Institute** seeks to integrate research, clinical practice, public health efforts, and educational programs to achieve the following four goals: 1) Improve the health of children, making the communities we serve among the world’s healthiest places for children and their families, 2) Address the issue of poverty and how it impacts child health, 3) Serve as a national and international model for what can be achieved in child health and 4) Train the next generation of child health leaders. The Institute aims to make a transformative impact on the lives of children and their families in Rhode Island, as well as around the world. Made stronger by its deep and far reaching collaborations, the Hassenfeld Institute is led by and partners with key organizations throughout Rhode Island. Its core leadership resides under the following four institutions: Brown University’s School of Public Health, Hasbro Children’s Hospital, the Warren Alpert Medical School of Brown University, and Women & Infants Hospital of Rhode Island. Researchers and child health professionals from other institutions, such as Bradley Hospital, The Miriam Hospital, and its community partners are also intricately involved.

The work of the Institute employs multidisciplinary research methods to address a broad range of child health issues. The Core Research and Evaluation Unit of the Hassenfeld Institute is tasked with providing the necessary research and evaluation infrastructure to support work on a broad range of health initiatives within the Institute as well as with the Institute partners. This includes extensive analysis and mapping of health data in Rhode Island, as well as launching a birth cohort study with long term follow up. Along with the work carried out by the Core Research and Evaluation Unit, the Hassenfeld Institute has assembled teams of experts to implement and assess innovative new approaches to address important child health issues. These teams will form the foundation of the Hassenfeld Initiatives. The Institute’s three initial initiatives are: 1) Healthy weight,
nutrition and physical fitness, 2) Autism (a precision medicine approach) and 3) Childhood asthma research innovation.

Institute for Molecular Nanoscale Innovation (IMNI): The Institute for Molecular and Nanoscale Innovation (IMNI) at Brown University was founded in 2007, and IMNI serves as an umbrella organization to support centers and collaborative research in materials, molecular and nanoscale sciences and technologies. IMNI is a "polydisciplinary" venture with over 80 participating faculty members representing nine departments across campus, and 12 staff members. Much of IMNI research activity is centered around three broad themes: (1) Center for Advanced Materials Research, (2) Center for Nanoscience & Soft Matter, (3) Nanohealth Initiative. IMNI serves as a focal point for interaction with industry, government, and Brown’s affiliated hospitals. IMNI supports and administers: seed funding, scientific team building, proposals preparation, post-award block grants, seminars, special events, and nanoscience course offerings across campus. IMNI manages three major core research facilities: Microelectronics Facility, Electron Microscopy Facility, NanoTools Facility - and the Joint Engineering/Physics Instrument Shop.

Institute at Brown for Environment & Society (IBES): The Institute at Brown for Environment & Society (IBES) supports research to understand the interactions between natural, human and social systems. IBES teaching programs prepare future leaders to envision and build a just and sustainable world. The Institute’s engagement programs take research from the lab to the statehouse, the hospital and the public sphere. Undergraduate and graduate students can study conservation science and policy, water and food security, environmental health, climate science and meteorology, biogeography and evolution, and more. Research is conducted in laboratories, on supercomputers and at field sites around the world.

Advance Clinical and Translational Research (Advance-CTR): serves to support and educate clinical and translational researchers in Rhode Island. The goal of Advance-CTR is to enhance collaboration and coordination of translational research in order to accelerate cross-disciplinary discoveries that improve health. Advance-CTR aims to: 1) Foster coordination between translational researchers at partner institutions, 2) Bring together the diverse clinical research resources to provide a home that facilitates new collaborations, 3) Eliminate obstacles that may prevent researchers from pursuing clinical research initiatives, 4) Educate, mentor and encourage young investigators in clinical research professional development, 5) Facilitate research to gather preliminary data necessary for developing competitive research proposals and 6) Sustain a clinical translational research environment by providing the necessary management and coordination of resources.

Advance-CTR is comprised of an Administrative Core; two Award Cores, the Pilot Projects Program and Professional Development; and three Service Cores, Clinical Research Design, Epidemiology and Biostatistics, Clinical Research Resources and Facilities, and Biomedical Informatics and Cyberinfrastructure Enhancement.

Administrative Core: The Administrative Core serves as the central operations hub for Advance-CTR. It includes two Project Managers, a Communication Manager, and one Assistant who report to the Advance-CTR Administrative Director. These individuals support the PD/PI; Program Coordinator, Strategic Planning Coordinator, the Internal and External Advisory Committees, the Steering Committee; and the six Cores. Administrative Core personnel assist the Core Leads in program management and planning, tracking and evaluation, budget development, allocation of resources, reporting and development of educational initiatives.

Pilot Projects Program: The Pilot Projects Program awards four investigators per year with one-year grants of $75,000 each in direct costs for clinical and translational research. Awarded proposals must be interdisciplinary with a focus on clinical, translational or community research. Priority is given to proposals that address statewide health priorities set forth by the Rhode Island Department of Health. Awardees gain the opportunity to experience planning and preparing research applications in an NIH format, respond to reviews and learn grant management skills in a collaborative, cross-disciplinary environment. Finally, awardees may take advantage of Advance-CTR’s research services in both the pre-proposal and post-award stages of their projects.

Professional Development Core: The Professional Development Core provides educational and mentoring opportunities to both junior and senior investigators. The Core includes the Mentored Research Awards program (MRAs), which is geared toward early career-stage investigators, especially those who identify as underrepresented minority individuals in STEM. The MRAs are given annually to three investigators from
Brown University and the University of Rhode Island. They are two-year awards that cover 75% salary up to $90,000 in direct costs. An additional $25,000 is also provided to cover research-related expenses or tuition (a Master's degree in Clinical and Translational Research from the Brown University School of Public Health is encouraged). Finally, the awards provide a structured mentoring program and training in clinical and translational research. Awardees are encouraged to take advantage of Advance-CTR's research services in both the pre-proposal and post-award stages of their projects.

**Biostatistics Core:** The Clinical Research Design, Epidemiology and Biostatistics Core provides a central location for Rhode Island investigators seeking quantitative and qualitative research design and analysis support through Advance-CTR. The Biostatistics Core links investigators with multidisciplinary faculty members and experts in various methodological techniques including biostatistics, epidemiology, qualitative data techniques and measurement and evaluation in health-related research.

**Clinical Research Support Core:** The Clinical Research Resources and Facilities Core is based at the Lifespan Clinical Research Center. Clinical Research Support is offered to Rhode Island investigators by highly trained research staff including clinical research coordinators, registered nurses, a medical technologist, and a phlebotomist. Investigators seeking Advance-CTR services have access to regulatory support, subject recruitment, space and support for the conduct for study visits, specimen collection and biobanking.

**Biomedical Informatics Core:** The Biomedical Informatics and Cyberinfrastructure Enhancement Core employs a team of data scientists to support research endeavors across the full spectrum of biomedicine. The Core offers investigators specific expertise in biological sequence analysis, data capture and management, biomedical data integration, knowledge representation and discovery, natural language processing and decision support.

**Dedicated Space:** A total of 6,946 square feet is dedicated to Advance-CTR across all partner institutions in Rhode Island. Central offices are located in downtown Providence, Rhode Island, adjacent to the Warren Alpert Medical School of Brown University and less than a mile from the Brown University School of Public Health, Lifespan and Care New England hospital systems. Other partners, including the Providence VA Medical Center and the Rhode Island Quality Institute are less than three miles away from the Administrative Core offices. This includes 2,281 square feet of space for the Administrative Core, the Pilot Project Program and the Biomedical Informatics Core. Shared building-wide resources include a small 209 square foot conference room with capacity of 8 people and a larger 365 square foot conference room with a capacity of 16 people. The building is serviced by a 10 Gigabits per second (Gbps) optical network (Cisco).

**Brown Institute for Brain Science (BIBS):** The Brown Institute for Brain Science (BIBS) advances multidisciplinary research, technology development, and training in the brain sciences and works to establish Brown University as an internationally recognized leader in brain research. BIBS unites more than 100 faculty from a diverse group of departments at Brown, spanning basic and clinical departments, and physical and biological sciences. BIBS provides a mechanism to advance interdisciplinary research efforts among this broad group. BIBS provides essential support to obtain and administer multi-investigator grants for research, infrastructure, and training. The Institute actively seeks new training funds to support interdisciplinary education that transcends that available in individual academic departments.

As one of its core missions, the Institute is developing and supporting a series of interdisciplinary research centers that focus on established or emerging areas of excellence in brain research at Brown. Each center bridges the physical and life sciences, and encompasses basic and translational research, including clinical application. The Center for Vision Research was created in 2007. Initiatives in Neurotechnology and in Synaptic and Neurodegenerative Disease are underway. BIBS has also established an MRI Research Facility and a Rodent Behavioral Phenotyping Facility. The existence of Brain Science as an overall organizing entity for a series of research centers and core facilities demonstrates the university's ongoing support for brain science research at Brown. This commitment will help to attract top faculty and students to Brown, enable higher quality research and establish Brown as a worldwide leader in brain science.

**Brown Center for Biomedical Informatics:** Brown Center for Biomedical Informatics (BCBI): BCBI was founded in July 2015 with the aim of becoming an internationally renowned leader in the development and application of biomedical informatics approaches, focused around three major areas: translational bioinformatics,
clinical informatics, and public health informatics. The mission of BCBI is to innovate how electronic biomedical
and health data are used, implement solutions for improving biomedical research and healthcare delivery, and
inspire the next generation of biomedical researchers and clinicians in partnership with collaborators in existing
areas of excellence at Brown, its healthcare affiliates, and statewide healthcare organizations. BCBI is centrally
located in office space in a building adjacent to the Medical School. This office suite space has 2,281 net
assignable square feet and includes 5 administrative support workstations, 8 offices, and a storage room for
supplies. Shared building wide resources include a 209 square foot conference room with capacity of 8 people
and a larger 365 square foot conference room with a capacity of 16 people. This area is serviced by a 10 Gigabits
per second (Gbps) optical network (Cisco).

Center for Computational Molecular Biology (CCMB): Center for Computational Molecular Biology: The
Center for Computational Molecular Biology (CCMB) at Brown was founded in September 2003 with the aim of
establishing a world-class center for research and scholarship in this new discipline. CCMB's central mission is
to make breakthrough discoveries in the life sciences at the molecular and cellular level through the creative
application of existing data analytic methods, and the development of novel computational, mathematical, and
statistical technologies required to exploit the opportunities emerging from advances in genomics and proteomics.
It is a research center that unites existing faculty research programs and does not support service staff for
computation or bioinformatics. CCMB occupies ~3000 square feet of space in the Watson Center for Information
Technology (CIT) at 115 Waterman Street. This includes office space for graduate students, postdoctoral
fellows, research staff and visitors, and a faculty member. In addition, there is a state-of-the-art seminar room
with dual projectors, a smart board and a floor-to-ceiling white board along one entire wall, and is used for the
weekly Computational Biology seminar series and research group meetings. CCMB has a full-time
administrative staff member for grant preparation and other administrative duties. The CCMB has 72 dedicated
cores on the OSCAR super computer.

Center for Biomedical Engineering (BME): The Center for Biomedical Engineering (BME) is a joint program
of the School of Engineering and the Division of Biology and Medicine. Biomedical engineering creates new
knowledge and improves human health through cross-disciplinary research and educational activities that
integrate the engineering and physical sciences with the life sciences and clinical practice. As a discipline, BME
is resoundingly inter-disciplinary and collaborative. Thus, at Brown, BME is a multi-disciplinary, inter-Divisional
and inter-Institutional activity. The mission of the Center is threefold: 1) To oversee the undergraduate BME
concentration and the BME graduate program (ScM & PhD) and to innovate (with scientific rigor, cross-cutting
disciplinary content) the BME curriculum to achieve a "Brown-style academic enrichment" - as an educational
paradigm for the field 2) To foster and enhance research synergy, connectivity and funding across the Brown
University community; from the engineering/physical sciences through the life sciences on campus to the medical
school and local hospitals; and to build connections with other centers at Brown (IMNI, BSP, VA Center), and 3)
To enhance the off-campus interface of Brown's BME community to industry, foundations, government labs,
other academic institutions and the public health care sector. Faculty engaged in scholarship and teaching as
part of the Center activities are from the School of Engineering, Departments of Physics, Chemistry, Computer
Science, and several basic science and clinical Departments of the Division of Biology and Medicine. The Center
is bridging the gap between clinical and basic research scientists through interaction with Brown's affiliated
hospitals. The research, teaching and service activities of this BME community pivots around three research
areas of nationally recognized excellence: Mechanobiology, Regenerative Engineering, and Neuroengineering.

The COBRE Center for Central Nervous System Function investigates the mechanisms of higher-brain
function, with a focus on attention, decision making and action and disorders that modify these key systems,
using a combination of genetic, behavior, and systems neuroscience approaches. This COBRE consists of five
research projects led by junior faculty. Eric Morrow will investigate the neurobiology of children diagnosed with
"difficult-to-treat autism," a group that often presents with obsessive compulsive behaviors. Dima Amso will
investigate the typical development of visual selective attention and the mechanisms of its disruption in autism
spectrum disorder. Michael Worden will examine selective attention mechanisms resulting from conflict. Wael
Asaad will investigate interactions between neocortex and basal ganglia during attention-based associative
decision-making. Joo-Hyun Song will investigate how multiple neural systems become integrated to select
actions, such as choosing to pick up a red instead of a blue pencil. A Design and Analysis Core, (Joseph Hogan,
Core Leader) will facilitate the research goals of these projects and benefit the broader community by developing
new tools and optimizing existing ones to image brain structure and function with MRI and EEG and neural
recordings; and ensuring proper experimental design and analysis procedures across projects. Project leader will individual senior faculty mentors (in once case two) who will provide support and guidance on research, publication, and grant preparation. The COBRE Center for Central Nervous System Function is a subunit of the Brown Institute for Brain Science.

The COBRE Center for Computational Biology of Human Disease embraces the age of genomics medicine from an explicitly data-driven, computational perspective. By building a collaborative Center of empirical and computational scientists, this COBRE advances new discoveries, algorithms, and genomic screening approaches with direct relevance to several human diseases. This is consistent with NIH's mission of supporting bioinformatics and computational biology to advance all areas of biomedicine. This Center provides a centralized service to assist researchers in computational, bioinformatic, and data management challenges of analyzing large data sets made available by modern 'omics' technologies. In addition, this funding will support the research activities of junior investigators to ensure their transition to stand-alone extramurally funded research scientists. This COBRE uses an innovative joint mentoring process, where each junior faculty member is advised by both computational and biological or clinical senior faculty members. In addition, staff data scientists in the Computational Biology Core will be active members of each of these laboratory groups to better integrate all phases of the research activities.

The Brown Data Science Initiative is a new collaboration at Brown between Applied Mathematics, Biostatistics, Computer Science, and Mathematics, that seeks to develop research and training around methodologies in Data Science and applications to domains. The Data Science Initiative represents an strong commitment on the part of Brown's Administration for infrastructure and faculty development in the foundational methods in Data Science as well as applications to domains. A broad range of research topics in Database Systems, Machine Learning, Pattern Theory, and Topological Data Analysis are already active at Brown, and will be complemented and developed by new faculty and postdocs as the initiative grows. These resources will be integrated across the spectrum of Data Science research at Brown. Brown's existing research strength in pattern theory and image processing is well established and represented by the work of Stuart Geman and Matt Harrison, as well as David Mumford (emeritus) carrying on the legacy of Ulf Grenander. The proposed project represents a new application avenue for the techniques developed in these premier departments at Brown, and its research outcomes will represent a premier component of the Data Science Initiative's research portfolio. Academic and professional programs in Data Science offer a rigorous, innovative, and reflective approach to learning and collaboration for anyone seeking a distinctive professional profile on which to build a career in data-enabled fields. As an initial step, a one-year Master's Program that prepares students from a wide range of disciplinary backgrounds will be offered.

Biology of Aging Initiative: The mission of the Biology of Aging Initiative is to promote at Brown University and at its affiliated hospitals research and education programs on the causes and treatment of aging. The Initiative complements already existing strengths such as clinical care and health services research by providing a focal point whose primary function is basic research on the biology of aging. The ultimate goal is to catalyze activity that will improve human health span. The Biology of Aging Initiative seeks to: 1) identify biological mechanisms that can extend healthy life, 2) develop interventions to ameliorate the negative aspects of aging. By assembling a core group of experienced scientists the Initiative is increasing the interactions among investigators interested in aging, attracting talented students to their laboratories, and promoting growth by recruiting top-ranked new faculty. In addition to escalating research activity, the Initiative also strives to inform and educate the Brown community and the public. The Initiative also runs a monthly Providence Area Aging Research Forum, an extramural Aging Seminar Series, and the annual Colloquium on the Biology of Human Aging.

Center for Alcohol and Addiction Studies: The Brown University Center for Alcohol and Addiction Studies (CAAS) in the School of Public Health is an internationally renowned research center in alcohol research. The mission is twofold: to conduct collaborative research that will lead to more effective treatment for alcohol and drug abuse, and to create a nationwide program in substance abuse, education and training for psychologists, physicians, medical students, and health care professionals. CAAS faculty conduct empirical research in a variety of areas of alcohol abuse/dependence, drug abuse/dependence and tobacco use, ranging from laboratory investigations of mechanisms through treatment or early intervention to policy. Funding comes from the federal government and a variety of foundations.
Comprehensive training is provided in how to conduct excellent research to predoctoral and postdoctoral research fellows. Faculty conduct clinical training seminars for practitioners at national and regional conferences. Faculty are involved in developing training curricula for medical schools and addiction training for clinicians as part of the ATTC. The CAAS houses the largest library of material on Alcoholics Anonymous, in conjunction with the Brown University library system. Faculty are involved in Physicians and Lawyers for National Drug Policy to align policy, practice, and public understanding with the scientific evidence that addiction is a preventable and treatable disease; to support the use of evidence-based, cost-effective approaches toward prevention and treatment; and to enable lawyers and physicians to provide effective and sustained leadership in this effort.

**Centers for Epidemiology and Environmental Health:** The goal of the School of Public Health Centers for Epidemiology and Environmental Health in the School of Public Health is to conduct epidemiologic studies of the causes, treatment and prevention of major health concerns at the population level. Members of the Center are epidemiologists, physicians and social scientists who combine state-of-the-art research methods with expertise in specific diseases, including cardiovascular, cancer, reproductive, nutritional, psychiatric and behavioral disorders. Research on etiology involves several large-scale longitudinal projects of representative community-based samples, in some cases followed over decades, to investigate the emergence of disease and disorder as well as the combined influences of environmental, nutritional, social & genetic factors on the incidence and course of these conditions. Randomized clinical trials and other clinical investigations are conducted in collaboration with leading hospitals and other treatment facilities in Rhode Island and throughout the U.S. to investigate the impact of new therapeutic technologies and to add to evidence-based treatment decisions in medicine and public health. Center faculty also collaborate regularly with Rhode Island agencies including the Departments of Health, Human Services, Education and others to assist with statewide analyses of population health and the implementation of population-based prevention efforts.

**Center for Evidence Synthesis in Health:** The Center for Evidence Synthesis in Health, in the School of Public Health, strives to improve health and well-being of individuals and populations. The Center promotes rational decision making by conducting research in, and teaching the principles of, research synthesis (systematic review and meta-analysis of individual participant and aggregate data) and evidence contextualization (decision and economic modeling). Research and training programs provide experiential learning and research opportunities for undergraduate, graduate and post-graduate scholars, and faculty and healthcare professionals within and outside the Brown community. The Center faculty develop methods and software tools, and apply these to solve important health concerns. The Center contributes to the School of Public Health’s effort to lead the nation’s comparative effectiveness research agenda, a cornerstone of the Affordable Care Act. The Center includes statisticians, clinicians, epidemiologists, librarians, computer scientists, and health services researchers. The Center collaborates with diverse groups of scholars and professional societies worldwide, in health and other disciplines. These collaborations have led to numerous publications in many fields.

**Center for Gerontology and Healthcare Research:** The Center for Gerontology and Healthcare Research in the School of Public Health is a nationally prominent research center that studies the diverse health and social service needs of elderly and other persons with chronic illnesses. Since the early 1980's, center faculty members have had substantial success in securing funding from the National Institutes of Health, the Agency for Healthcare Research and Quality, and the Health Care Financing Administration, as well as from numerous philanthropic foundations. The research findings of center faculty have, as intended, figured prominently over the years as valuable guides for government agencies making decisions regarding policy aimed at improving health and health care for aging and disabled populations. Initiating new lines of research on previously unstudied or understudied populations is a hallmark of the center work. The Center for Gerontology and Healthcare Research is located on the campus of Brown University in the city of Providence, Rhode Island and is the administrative home of the Center for Long-Term Care Quality & Innovation.

**Center for Health Equity Research:** The mission of the Center for Health Equity Research (CHER), in the School of Public Health, is to improve health, especially in underserved populations, by conducting interdisciplinary research and education to empower individuals, providers, organizations, and communities to practice and promote healthier behaviors and environments. One of 12 active, nationally renowned research centers within Brown’s School of Public Health, CHER conducts interdisciplinary, empirical research to promote healthier behaviors and environments. CHER’s overarching topical strengths are in the areas of HIV primary and secondary prevention, global public health, LGBT health, substance addiction treatment, obesity, smoking,
exercise and nutrition, and behavioral medicine. The CHER faculty have collective expertise in intervention development and testing, clinical trials, epidemiologic methods, advanced biostatistics, qualitative research, and program evaluation. The Center maintains strong collaborative relationships with a wide array of hospitals, community service organizations, and worksites, as well as with major funding institutions. CHER faculty mentor and train undergraduate, master’s, and doctoral students, as well as clinical and research post-doctoral fellows. The Center actively pursues and receives grants from a variety of funding sources, including but not limited to the AmFAR Foundation for AIDS Research, Centers for Disease Control and Prevention, the Harvard University Center for AIDS Research, the Providence/Boston Center for AIDS Research, MAC AIDS Fund, National Institutes of Health, Robert Wood Johnson Foundation, and Tufts Health Plan Foundation.

Center for Long-Term Care Quality & Innovation: Brown’s Center for Long-Term Care Quality & Innovation (Q&I Center) in the School of Public Health links researchers with providers to test and disseminate interventions to improve care for individuals receiving post-acute and long-term care. The Center partners with innovators (providers, researchers, or others) who have developed transformative strategies to improve quality of care and outcomes. The Center does not fund research but instead works with innovators to seek funding to prove the interventions effective and/or to spread successes widely.

Center for Statistical Sciences: The Brown University Center for Statistical Sciences (CSS) in the School of Public Health was founded in 1995 to foster research and statistical education at Brown Medical School and the University at large. Center activity and personnel have grown over the years to the present configuration of over twenty faculty members, staff biostatisticians, graduate student assistants, and administrative and computing support personnel. CSS faculty and staff conduct methodologic research in a number of areas of biostatistics, including statistical methods for the assessment of diagnostic technology, design and analysis of clinical trials, statistical methods for health services and outcomes research, longitudinal data analysis, methodology for the analysis of observational studies, meta-analysis, and statistical methods for psychiatry and the behavioral sciences. The Center also serves as the biostatistics core for both national and local biomedical research projects. Owing to its expertise in the evaluation of diagnostic technology, CSS hosts the Biostatistics Center of the American College of Radiology Imaging Network, a NCI (National Cancer Institute)-funded collaborative group conducting multi-center studies of imaging modalities for cancer screening, diagnosis, and image-guided therapy. In addition to ACRIN, current federally funded collaborative research projects at CSS include the biostatistics cores of International Breast MRI Consortium, the Brown/Lifespan/Tufts Center for AIDS Research, the Brown/Lifespan Transdisciplinary Tobacco Use Research Center, and projects in health services and outcomes research.

A graduate curriculum in biostatistics is offered by Center faculty as a track of the graduate program of the Department of Community Health. The program was launched in September 1999 and leads to MS and PhD degrees in Biostatistics. Center faculty also launched the Brown undergraduate concentration in Statistics, in collaboration with departments across the campus. The Center organizes the Brown Statistics Seminar, which is held on Monday afternoons and features talks on current developments in statistical methodology and is open to the entire Brown community. In addition, Center faculty are holding regular "brown-bag" seminars in which topics of current research are discussed. Presenters in these informal seminars include Brown graduate students and faculty as well as other campus- and hospital-based research.

The Center for Environmental Health and Technology (CEHT) fosters and facilitates interactions between a number of related activities within the Brown community, including the School of Public Health, the School of Medicine, and the School of Engineering. The Center is also active in seeking interaction with the Institute at Brown for Environmental Studies (IBES). Specific goals include: 1) Development of an Environmental Health Section within the Department of Epidemiology in the Brown University School of Public Health, 2) Encourage the integration of Environmental Health across the entire Brown University campus, including IBES, The School of Medicine, the Watson Institute and the School of Engineering, 3) Develop and enlarge the research and training base in translational science 4) Further development of significant grant funding that supports research in environmental health across the University and Hospitals by competing for funding that broadly catalyzes these efforts, and sharing funds via pilot project support 5) Engage in effective Community Outreach to communicate the potential health hazards and to guide the development of plans for the appropriate remediation and reuse of contaminated sites, assuring continued economic development and job growth within densely populated urban and suburban centers.
The Center for Vision Research, part of Brown University's interdisciplinary Institute for Brain Science, promotes and facilitates research on biological vision, computational aspects of machine vision, visual disorders, and the brain mechanisms underlying vision. The CVR provides in-depth training in vision research to postdoctoral fellows, medical residents, graduate students, and undergraduates, and serves as a unifying organization spanning traditional departments, as well helping to bridge the gap between basic research and clinical practice. Vision Research at Brown includes over 40 faculty from 10 departments. What sets the Brown vision community apart is the unusually strong interactions between departments, and especially between faculty members in more quantitative disciplines (e.g. applied math, computer science, engineering, physics) and faculty in more biological or behavior-oriented disciplines (e.g. cognitive science, neuroscience, psychology). The Center's goal is to nurture multidisciplinary and translational research. Examples include theoretical studies of vision and visual plasticity in concert with experimental tests; biologically-inspired vision models implemented in artificial systems; and models of visual-cortical processing to address "high-level" visual deficits in developmental disorders such as Autism Spectrum Disorder. The Center for Vision Research in concert with the Institute for Brain Science supports the research of undergraduates, graduate students, and postdoctoral fellows through fellowships and a training grant.

Brown University Superfund Research Program (SRP): The Brown University Superfund Research Program (SRP), Toxicant Exposures in Rhode Island: Past, Present, and Future, is focused on complex environmental contaminant issues in Rhode Island. Rhode Island has a long history of industrial activity resulting in extensive contamination. An academic-government-community partnership model is a key feature of the overall SRP research strategy. Together the SRP partners work to expand the understanding of the human health consequences and management of contaminated sites in Rhode Island and other post-industrial states. SRP research embraces the complexity of mixed contaminants and their inevitable proximity to dense population centers, and is responsive to the needs of government and community partners in managing the problems that this causes. NIEHS, U01ES020913, PI Kim Boekelheide

BROWN INFORMATIONAL TECHNOLOGY AND COMPUTATIONAL RESOURCES

Computer and Information Sciences (CIS). Brown University’s network infrastructure is comprised of a state of the art fiber optic backbone connecting a majority of buildings on campus. Support is available through Computing & Information Services (CIS), a centralized computing department at Brown. CIS supports a secure computing environment (referred to as “Stronghold”) for sensitive and protected data that adopts HIPAA security measures. CIS also provides a high-performance computing platform through the Center for Computation and Visualization. The computing platform comprises a 7,000+ core IBM iDataPlex system with 216 GPU's for accelerated computing, and peak performance of roughly 540 Teraflops. A GPFS parallel filesystem provides roughly 527 Terabytes of disk storage, and 40 Gb/s Infiniband connectivity is used for all parallel applications messaging and I/O. The storage system is integrated with a 2 Petabyte Tivoli TSM backup/archival system. Redundant fiber connectivity provides for high availability. Redundant Internet connectivity provides high availability to the Internet and 12 research sites. Brown University utilizes Cisco Systems networking equipment configured for high availability. Maintenance support contracts are maintained on all network equipment. An equipment renewal process is funded to refresh networking technologies. All new networking equipment is covered under maintenance contracts and the renewal process is managed by the Computer Information Technology office.

Brown University has a centralized telephone system providing voice services to the campus. These services include voice conferencing, voice mail and call routing. Brown also is a pioneer with Google Business Solutions for email. This solution not only provides email but text chat, video chat and calendaring as well. Brown is also a WebEx customer for Web collaboration and provides this service to the campus. Video conferencing is also a service provided by a center Media Services team. This team also supports classroom support for media technology. Brown University utilizes technology that provides for high system availability for centrally managed application. Techniques such as clustering and backup ensure the reliability and availability of data. Critical infrastructure systems such, directory services, authentication/authorization services, file services, web services, etc. are run in a high availability clustered configuration wherever possible. Brown utilizes a number of different strategies including load balancing, active/passive clustering, and active/active clustering. Data for highly available systems is stored on an EMC storage array with a minimum of RAID 5 configuration and accessed over multiple paths through a redundant SAN. All data in the data center is backed up with a weekly full and daily
incremental to disk Cloned tape copies of the disk backups are stored offsite at Iron Mountain. All centrally-
managed electronic directories strictly adhere to FERPA opt-out provisions.

**IT Security Program.** There is a full-time IT Security Officer, two full-time Security Engineers and one full-time
Security Communications Specialist. These full time positions provide the resources needed to ensure a secure
computing environment. Brown University has policies in place to provide acceptable levels of security. A
Comprehensive set of IT-related policies, review process and maintenance schedule are posted on the Brown
Web Site. Brown offers training to faculty, staff and students who handle confidential information or manage
LANs or servers. There are security training options available in Brown’s online training system. Brown offers
firewall protection for departments where confidential information is generated and managed. The majority of
administrative departments at Brown have firewalls implemented. All centrally managed enterprise applications
are protected. Departments can be provided firewall services upon request. Brown manages a variety of security
technologies to secure onsite and remote access to data. An IDS solution (Intrusion Detection), Secure Wireless,
Secure Remote Access (Virtual Private Network) and network registration for students, provides secure access
to data on and off campus. Brown University uses Google Apps as its central collaboration platform,
encumbering email, group calendaring, websites, and video chat. In addition Brown offers wiki and blog
systems, and advanced video chat through WebEx.

**Data Science Practice (DSP):** The Data Science Practice (DSP) is a centralized group within CIS that
consolidates “big data” expertise and makes expert technical staff available to researchers and administrators
across campus. By embedding these staff in research labs and groups and forming close partnerships with
faculty, the DSP supports data-intensive projects across the physical, life and social sciences, and the
humanities. Currently made up of seven full-time staff (with three more positions recently opened), the team’s
expertise spans machine learning, informatics and data-intensive computing, data exploration and visualization,
data management, high-performance computing, and software engineering. Facilities include ~2,000 square feet
of offices and conference rooms in CIS offices at 3 Davol Square.

**High-Bandwidth Optical Fiber Connectivity:** An EPSCoR Infrastructure Improvement Award to Brown
University (Dr. Edward Hawrot, PI) now provides 10Gbps per lambda (laser light wavelength) connection
between Brown’s Laboratory for Molecular Medicine at 70 Ship Street, the new Medical school building located
in the heart of Providence’s historic Jewelry District and the core campus. Similar high-bandwidth connectivity is
provided to a nearby university branch building on the edge of the Jewelry District that is home for Statistical
Sciences and the School in Public Health. Other nodes provide connection to the core Brown network on-
campus, the OSHEAN network terminus in the Foundry building located in downtown Providence, the University
of Rhode Island Providence campus at 80 Washington Street where the URI’s Providence Biotechnology Center
is located. The lambda connection now connects us to other EPSCoR institutions in New England. OSHEAN
access from the Foundry node provides 10 Gbps per lambda connectivity to Boston and New York and beyond.

**Center for Computation and Visualization (CCV):** The mission of CCV is to provide the scientific and technical
computing expertise required to advance computational research and support Brown’s academic mission. The
accelerated transformation of the pace and impact of computational approaches led to Brown University’s
recognition of the importance of high performance computing across all of its disciplines. As a result, Brown and
IBM developed a $4M investment in a high performance computing service platform known as OSCAR that is
available statewide to researchers. The equipment is maintained and operated by the staff of the Center for
Computation and Visualization (CCV), which has extensive experience in operating shared computational
clusters. CCV staff are responsible for scheduled maintenance, access control as needed, and integration with
research specific hardware as required by NIH funded researchers. CCV staff also take care of all financial
aspects of operating and maintaining the facility.

**High Performance Computing.** The high-performance computing resources at CCV equip the Brown research
community to undertake complex numerical simulation, modeling, and data analysis. Oscar is the primary
research computing cluster with several hundred multi-core nodes sharing a high-performance interconnect and
file system. Applications can be run interactively or scheduled as batch jobs. Several large memory nodes
provide substantially more memory than is available on typical workstations and laptops. A large collection of
software is available on CCV systems, including: python, perl, R, Matlab, Mathematica, Maple, optimized math
and science libraries, and domain-specific applications. CCV staff can help acquire and install most applications
upon request. The technical specifications of Oscar are:
• Two login nodes provide access for application development, debugging and batch job management
• About 400 compute nodes up to current specs of dual 12-core processors and 128 GB of memory
• Specialized nodes containing GPU processors or 512 GB of memory
• High-bandwidth/low-latency Infiniband interconnects
• DDR3 memory (1333 GHz)
• Diskless nodes with I/O provided by an IBM GPFS parallel file system
• 500 TB of usable disk space
• CentOS 6.7 Linux operating system
• SLURM workload manager
• Theoretical peak performance of 657.8 Teraflops

Data Storage, Backup and Archiving: CCV provides storage for large research files connected to the HPC system. A default allocation of 256 GB (also called Rdata) is given to all faculty members at Brown, on a per request basis, with the option of purchasing additional storage as needed. Long term storage and backups are available on a fee basis. Storage can be purchased in increments of terabytes for periods of up to 6 years. The cost for backups is included when storage is purchased. Data is incrementally backed up to tape on a daily basis. In addition, snapshots for the last 7 days are available on line for quick restores. Long term archiving of files to tape (one or two copies) can be purchased as needed. Tape libraries are housed at two separate locations to enable disaster/recovery scenarios. These research storage allocations can be easily mounted to desktops or other computer systems to allow for easy access and sharing files. Details of HPC file storage at CCV

• Rdata is accessible from all CCV systems (/gpfs/data)
• Can be mounted to all desktops on Brown’s campus network
• Is backed up on a daily incremental basis
• Rdata allocations can be increased by purchasing additional storage
• Home directory on Oscar: All users will have access to a home (/gpfs/home) allocation of 10 GB. This allocation is backed up on a daily basis.

Group storage: Premium accounts (see premium) will be entitled to an additional allocation of 256 GB that may be merged with Rdata (for primary PI). Likewise, group premium accounts will be entitled to additional 25 GB per user.

• Snapshots: Daily snapshots are available for both Rdata and Home file systems for 7 consecutive days.
• Scratch: Space for temporary files is available as (/gpfs/scratch). These files are not backed up and scratch space is strictly for temporary files. Files may be purged after 30 days or as the file system is being utilized. This allocation will be managed by an application called xdisk (time versus space) (work in progress).
• Sharing data: Sharing files that are too big to be sent via email. There is a 10 GB quota and a limit of 2 GB per file.
• Users can access RData from the CIFS share. This can be mapped as a drive in Windows and mounted in Mac OS X and Linux from any campus system (off-campus use requires a VPN connection to campus). Users can also access files by using a file transfer tool like Secure Copy (SCP), Secure FTP (SFTP), or rsync.

Software: A key benefit of using these computing resources is that CCV installs and maintains a large collection of computational research software. CCV can install most software packages upon request. Examples of software packages available are:

• MATLAB: Developed by MathWorks, MATLAB is a numerical computing environment. It is useful for performing numerical computations with matrices and vectors, data visualization (e.g. plotting of functions and data), and implementation of models and algorithms. MATLAB can also interface with programs written in other languages, including C, C++, Java, and Fortran.
• Python: Python is a general-purpose programming language with a design philosophy that emphasizes code readability. Its efficient high-level data structures and approach to object-oriented programming makes it an easy to learn, powerful programming language. Altogether, Python is an ideal language for scripting and rapid application development.
• R (Statistical Language): R is a programming language and environment for statistical computing and graphics. The R language is widely used among statisticians and data miners to analyze data and develop applications.
• MPI (Message Passing Interface): Standard C and Fortran do not have constructs that support parallelism. The Message Passing Interface (MPI) was developed as a standard using commonly-available operating system services to create parallel processes and exchange information among these processes.
• Bioinformatics: SeqDB, a file format, compressor and storage tool for the raw data produced by Next-Generation Sequencing platforms like the like the Illumina HiSeq 2000 and MiSeq and the Life Technologies Ion Torrent PGM.
• BioLite, a lightweight bioinformatics framework with automated tracking of diagnostics and provenance.
• Agalma, an automated pipeline for assembling and analyzing transcriptome data.

High-Performance Computing Software
• PyModules, an alternative implementation of the Environment Modules system for managing software environments on research computing clusters.
• HPCmatlab, a framework for fast prototyping of parallel applications in Matlab. It uses the Message Passing Interface (MPI) for sending and receiving messages among different Matlab processes.

Cybersecurity: The cybersecurity program at Brown University is a collaborative initiative comprised of several internal teams brought together for the purpose of proactively managing security exposures or vulnerabilities, and reactively handling incidents that may arise in Brown's computing environment. The purpose of the cybersecurity program is to develop, coordinate, drive, and maintain the cross-functional efforts necessary for Brown University to effectively manage security exposures, critical vulnerabilities, or cybersecurity incidents that span Brown's various technology platforms. The program also aims to maintain capabilities in several procedural areas, including security awareness, readiness, detection, communication, remediation, incident root cause analysis, education, and process improvement. The program includes management and procedural guidelines, policies, and training and awareness opportunities to assist staff in recognizing, identifying, and coordinating an appropriate response to attacks on Brown University information assets.

Documentation and procedures are also an integral piece of the program, designed to reduce overall security event exposure for Brown University, initiate a more effective and efficient incident response, decrease total time to incident resolution, outline basic regulatory responsibilities, and promote the ethical obligations surrounding the handling of sensitive data or personal information. It is the mission of the Cybersecurity Incident Response Team (CIRT), a keystone of the program, to provide for the coordination of the response to, and investigation of, attacks on Brown University information assets. The CIRT also provides guidance on detecting, containing, and recovering from computer security incidents. Coordinated by the Information Security Group, the CIRT is responsible for managing responses to computer security events throughout the Brown infrastructure, including third-party-hosted systems. The degree of involvement of CIRT personnel in an event is dependent upon the event's severity or potential impact to University operations.

• Security Awareness: Any major enterprise that relies on heavy use of technology must stay aware of the vulnerabilities and emerging threats associated with those technologies. Protective techniques and safeguards must be consistently reviewed and updated using outside sources, vendors, partners, and other alliances that provide information about new technology threats.
• Readiness: Whether one's responsibilities are technological, operational, or professional, staff must understand clearly the security concerns that may exist within their realm of responsibility. Staff should be familiar with University policy, Computing and Information Services (CIS) and Information Security Group (ISG) policy, and the inherent security risks or responsibilities that exist within their job role. People, systems, policies, and processes need to remain organized to make the University computing environment suitable for effective management of threats.
• Detection: As a major computing enterprise, CIS must operate an array of monitoring systems suitable for the environment. Intrusion detection, monitoring of standard configurations, and early warnings of abnormal activity must be properly maintained to ensure that adverse events can be acted upon quickly.
• Communication: Effective communication among technology staff, professional staff, academic departments, strategic vendors, and sometimes the external community is critical when handling security incidents. Information must be communicated clearly and accurately to affected areas about any developing security crisis and the active management of an ongoing incident. Sound communications plans allow for the expedient gathering of resources when emergency efforts are needed. It is also imperative that internal Brown technical and professional teams work together when wider communications to the University community is necessary.

• Remediation, Mitigation, Eradication, Containment and Control: In the event of a cybersecurity incident, prompt remediation of the situation includes one or more of the following actions: stopping the attack, applying vendor software patches, implementing creative solutions to eliminate the risk, or containing and controlling a propagation-based malware threat. Whatever the situation, plans and scenarios need to be discussed to ensure that short-term effective strategies can be implemented quickly to contain a problem.

• Root Cause Analysis: Identification of a problem's root cause is essential to making sure the same incident does not recur. Root cause analysis is also important for regulatory reporting requirements which may be necessary in some cases. Whatever exercises are necessary, teams must work to facilitate the analysis necessary to determine problem causes. Such exercises include forensic investigations where appropriate.

• Education and Process Improvement: Teams must study the root causes of incidents and how they are handled. Process improvement and implementation of lessons learned is essential to grow cybersecurity defense capabilities. After studying incidents and the effectiveness of response to them, team must work to implement new processes as necessary to ensure better protection in the future.

BROWN UNIVERSITY LIBRARY RESOURCES

Brown University Library. The Brown library is located in 5 separate facilities, contains over 3.8 million items and adds 60,000 more each year. The Library subscribes to well over 500,000 electronic books in many subjects. Most are available in large collections which can be searched through the publisher’s interface; all are individually cataloged. In addition to the collections to which the Library subscribes, several publically available e-book collections are listed. The Sciences Library contains biological and medical serials. The library is a member of the Center for Research Libraries and the Research Libraries Group, which provides free interlibrary loan services, photocopying of articles, and access to cooperating research libraries. Each of the participating hospitals within the Department of Medicine maintains a specialized library.

Researchers at Brown (VIVO). The Library, along with colleagues in Computing and Information Services (CIS) and the offices of the Dean of the Faculty and the Vice President for Research, launched a new, campus-wide service that offers Brown faculty an online platform for sharing their research, publications, and professional work with the Brown community and the world at large. The service, called “Researchers@Brown,” is derived from VIVO software, which was developed in recent years by Cornell University, the University of Florida, and a number of other academic partners. VIVO is based on semantic web technology, which provides capabilities for linking concepts, subjects, people, and organizations across institutional boundaries. While Brown’s VIVO implementation is in its early days, it positions the work of Brown researchers to be discoverable and accessible in a variety of new ways and helps highlight the unique expertise of Brown faculty in the broader academic landscape. Researchers@Brown profiles have been created for all regular faculty at the University. Their profiles include biographies, research interests, educational background, publications, and professional activity. Faculty members can manage their own profiles or can assign a delegate to update them. On a rolling basis throughout 2014 and beyond, the Library will continue to enhance and refine the system by structuring bibliographic data to enhance the discoverability of faculty publication data and by offering more automated tools for harvesting faculty publications from resources such as PubMed and Web of Science. The potential of Researchers@Brown to highlight and share Brown’s intellectual productivity will be most effectively realized by linking researchers’ profiles to related resources on the web. To help with that, the Library has subscribed to ORCID (Open Researcher and Contributor ID). ORCID allows researchers to create unique, personal semantic web identifiers that they can embed within their journal submissions, web sites, and social media profiles as well as within the Researchers@Brown system. By establishing links between these outlets, Researchers@Brown can offer a more comprehensive view of a researcher’s work and can leverage the power of the web to enhance Brown’s visibility and impact. Peers and other institutions are rolling out VIVO and pursuing similar semantic web
initiatives that bring their work into conversation with the broader web of data. By being part of this movement, Brown is poised to have a significant impact on the way learners, researchers, and institutions discover and disseminate scholarship.

**Scientific Data Management:** A Scientific Data Management Specialist is available to work with students and faculty researchers in the sciences interested in writing data management and sharing plans for sponsored research. Then Specialist can serve as a partner to plan for the management of the data throughout the lifecycle of their research project. Services provided include consultation on data management issues, depositing data and supplementary files in a repository, and citing and publishing data.

**Health Sciences Library Resources.** The Health Science Librarian can assist researchers in research planning, conducting research, publishing research and sharing data. Services include assistance with finding funding, writing a data management plan, sourcing data, conducting a literature review, organizing citations, analyzing and visualizing data, compliance with funders' public access policies, depositing research products into a repository, obtaining a Digital Object Identifier (DOI) and measuring the impact of the research. Regularly scheduled workshops are offered on citing and publishing research data, using data tools, building a better poster, and understanding public access policies and the NIH public access policy.

**BROWN RESEARCH CORE FACILITIES**

**Animal Care Facility:** Brown University shares a mission with other institutions of higher learning in the responsibility to advance the understanding of living organisms through studies of the behavioral and biological processes upon which their survival and well-being depends. Research involving laboratory animals has an essential role in this process. There are approximately 70 Brown-based or Brown affiliated investigators who use vertebrate animals in their research and approximately 115 active IACUC protocols in a given year.

The program of animal care and use at Brown University is accredited by the Association for the Assessment and Accreditation of Laboratory Animal Care, International, (AAALAC), and is registered with and inspected by the U.S Department of Agriculture (USDA). Brown’s Assurance of compliance with the Public Health Service Policy on Humane Care and Use of Laboratory Animals has been reviewed and accepted by the Office of Laboratory Animal Welfare (OLAW) of the National Institutes of Health (NIH). All animals are maintained in accordance with the National Research Council Guide for the Care and Use of Laboratory Animals. The animal care program is directed by attending veterinarian Lara Helwig, D.V.M., a diplomate of the American College of Laboratory Animal Medicine, (DACLAM). The facility is staffed by 3 full time veterinarians, all ACLAM diplomats. The veterinary staff provides veterinary services to research investigators at three of the area hospitals affiliated with the Warren Alpert Medical School. They are responsible for the health care of all animals in the facilities, the review of all IACUC-approved animal care and use protocols, appropriate training/procedural oversight for investigators, and assisting investigators in any animal related queries. The veterinary staff is on site and a clinical veterinarian is available at all times. Animal care staff provides daily feeding, watering and cleaning to all species. Veterinary technicians provide health surveillance and technical assistance. Brown’s animal facilities include specialized housing and equipment for a wide variety of species. Dedicated surgical suites are available as well as dedicated procedural areas. A radiological suite is available and an ethylene oxide (ETO) sterilization machine for items which cannot withstand pressures and or temperatures of steam autoclaving.

**BioMed Core Research Facilities:** Graduate student education and research training at Brown University benefits from a wide range of cutting edge facilities, instrumentation, and other resources to support these endeavors. Brown University’s Shared Technology Resource (Core) Facilities function at the level of service, research, and teaching. Serving as centers of intellectual exchange and collaboration, each technology-focused core provides a broad spectrum of investigators access to cutting edge instrumentation, current technologies, and expert consultation. The facilities are financed by a mixed funding model that includes grant awards, user fees, and institutional support. Additional cost effectiveness and efficiency are achieved by decreased equipment duplication, economy of scale savings, improved quality control, and rapid turnaround times. Advanced technology platforms of similar scale and productivity would not be financially feasible for any individual lab to purchase, upgrade, and maintain. Each facility is staffed by highly trained personnel that provide exceptional customer service and resource management. Faculty oversight and facility user committees advise the core directors. A PhD, MBA-level Director of Research Operations provides assistance with facility operations and fiscal management and serves as a liaison between the core directors and research
administration. The timely acquisition of new instrumentation in the core facilities and the frequent implementation of new technologies facilitate faculty recruitment, education, and training of students, and support research funding.

- **Bioimaging Facility:** The Leduc Bioimaging facility has two locations: the Laboratories for Molecular Medicine, 70 Ship St and Sidney Frank Hall of Life Sciences, 185 Meeting St. The facility has a PhD-level director and MS-level microscopist manager. These facilities provide equipment and instruction dedicated to high-resolution imaging for life science research. Facility instrumentation includes a serial block-face scanning electron microscope, Philips 410 transmission electron microscope, with goniometer stage, low-dose imaging equipment, an ATM digital imaging system, and a Hitachi 2700 scanning electron microscope equipped with a backscatter detector, lanthanum hexaboride gun, and a Quartz PCI digital imaging system. The facility also houses an Olympus multiphoton laser scanning microscope, Zeiss LSM800, LSM710 and LSM 510 confocal laser scanning microscopes, two Zeiss Axiovert 200M fluorescence microscopes with DIC, phase contrast, and a stage heater for live imaging, and a Zeiss Lumar fluorescence stereomicroscope. MetaMorph software is available for image analysis. Training in microscopy, image analysis, and ultrathin sectioning is provided at both sites. This facility receives partial support from the Division of Biology and Medicine, the Provost’s Office and the Brown Institute for Brain Science, Brown University.

- **Bioinformatics:** Bioinformatics Analysts support the data intensive core facilities at Brown University. The Analysts collect and process the high throughput sequence data and help with the overall data management process. They are a general source of advice on existing tools and methods for genomic, metagenomic and transcriptomic analysis, genome annotation, gene expression profiling, metabolomics (downstream functional analysis), and epigenetic analysis and a resource for structural bioinformatics, proteome analysis, and general data-mining strategies. The Bioinformatics Analysts are responsible for developing and maintaining data workflows and pipelines and coordinating with computational facilities for data processing and storage/archiving. The Analysts provide access to online educational tools and customized software and are readily available to provide individual training to investigators. The Analysts provide bioinformatics application development and data analysis service for collaborative bioinformatics projects.

- **Flow Cytometry:** Biomedical Center, 171 Meeting St. The facility is directed by a PhD-level investigator and managed by a research technician who performs the flow cytometry based analysis and cell sorting. The primary facility instrument is a Becton Dickinson FACSAria III, a 4-laser, 19-parameter instrument for flow and sorting application including DNA cell cycle analyses, bead based immunoassays, and sort capabilities of four populations. Each laser (Blue 488, Yellow/Green 561, Red 633, and Violet 407) is listed on the core website with all available corresponding detectors. Users may find it helpful to be able to pick and choose from the lists of the most common dyes on the market. The FACSAria III is capable of rapid sorting of cells, bacteria, yeast, tagged targets, and other small particles based on multiple parameter characteristics into highly pure populations. Its advanced fluidics and optics design offers increased research capabilities across a variety of scientific disciplines. A fixed-alignment cuvette flow cell provides superior fluorescence sensitivity. A dedicated computer workstation with FlowJo data analysis software is provided for the facility users. This facility was supported in part by NCCR equipment grant 1S10RR021051, the Division of Biology and Medicine and the Provost’s Office, Brown University.

- **Genomics:** Laboratories for Molecular Medicine, 70 Ship Street. The genomics facility is directed by a PhD level director and is staffed by a junior research technician. This facility provides investigators ready access to a wide variety of advanced instrumentation, genomic technologies, data analytical services, and training. DNA sequencing services are provided through a Genomics Facility pricing agreement with GENEWIZ. Other facility instrumentation includes microarray analysis using the Affymetrix Gene Chip Workstation, an ABI ViiA™ 7 Real-Time PCR System, a BIO-RAD QX200 Droplet Digital PCR, an ABI 7900 Real Time PCR machine, an Advanced Analytical Fragment Analyzer, a Covaris S220 Ultra-Sonicator, an Agilent 2100 Bioanalyzer, a Molecular Dynamics Typhoon 9410 Variable Mode Imager, a Spectra Max M5 Scanner, a LI-COR Odyssey Infrared Imaging System, an AXON GenePix 4000B Scanner, a Beckman Optima Max Ultracentrifuge, a Nanodrop ND 1000, and a Becton Dickinson FACSCalibur Flow Cytometer. This facility was partially supported by the National Institutes of Health (NCCR Grant Nos. P30RR031153, P20RR018728 and S10RR027634), the National Science Foundation (EPSCoR Grant Nos. 0554548 and 1004057), Lifespan-Rhode Island Hospital and the Division of Biology and Medicine and the Provost’s Office, Brown University.
Magnetic Resonance Imaging: Sidney Frank Hall of Life Sciences, 185 Meeting St. This facility is directed by a PhD-level investigator, managed by two PhD-level Associate Directors, and staffed by a registered radiography technologist specialized in magnetic resonance imaging. The centerpiece of the Facility is a state-of-the-art research dedicated Siemens 3 Tesla TIM Trio. The scanner is equipped with 32 receiver channels for significant gains in signal-to-noise ratio and acquisition speed and a high performance gradient insert for small animal imaging and small animal coils are available. Experiments involving visual or auditory stimulus presentation, physiological monitoring, participant monitoring, and eye tracking can be conducted. An MRI simulator and MRI-compatible EEG are available and data is collected on a high performance computer cluster. The MRI Research Facility provides infrastructure and support to facilitate research and educational activities using magnetic resonance imaging technology. Ongoing research includes studies of brain structure and function in normal and clinical populations as well as studies of other body systems, non-invasive animal imaging and materials science. This facility has received partial support from the National Science Foundation, the US Department of Defense, Dr. Ralph and Marian Falk Medical Research Trust, Butler Hospital, the Provost’s Office and the Institute for Brain Science at Brown University.

Drosophila Media Prep Kitchen. Biomedical Center, 171 Meeting St. This facility is directed by a PhD level investigator and staffed by a media prep assistant. The Brown Fly Facility is dedicated to providing investigators with high quality media for Drosophila research. In the centralized kitchen, a standard cornmeal, sucrose, yeast medium is prepared and dispensed into different sized culture vessels. Media is prepared in a steam-jacketed food kettle and pumped into trays of glass vials (10ml), plastic vials (10ml) or into plastic bottles (30ml) depending on research needs. Media is prepared according to a strict protocol that ensures consistency in diet and the absence of any bacterial, fungal or insect contamination. Researchers using glass vials return them to the facility where they are autoclaved, washed, and filled again. The media kitchen is equipped with a food service quality steam kettle fitted with stirring unit, a Steris autoclave and a Lancer Washer fitted with custom racks for glass vials. Media is dispensed using Filamatic and Materflex/ Digistalic pumps. This facility has received partial support from the Division of Biology and Medicine, the Provost’s Office and the Brown Institute for Brain Science, Brown University.

Molecular Pathology Core Research Laboratory: Laboratories for Molecular Medicine, 70 Ship St. This facility is directed by a PhD-level research investigator and managed by a histotechnologist. The research laboratory, which is open to graduate students, faculty, and staff, provides histopathological, immunohistochemical and immunocytochemical technologies. Processing, embedding, sectioning, and staining of specimens is provided along with educational and hands on training. The facility instruments include a ScanScope CS digital slide scanning system from Aperio Technologies for image analysis, a FujiT Bas 1000 phosphor imager, a Nikon Eclipse TS100 inverted fluorescence microscope, a Nikon E800 microscope with a digital camera, a Vibratome for soft tissue sectioning, and an Arcturus PixCell II laser capture microdissection system. This facility has received partial support from the National Institutes of Health (NIEHS Grant No. P42ES013660).

Mouse Transgenics and Gene Targeting: Laboratories for Molecular Medicine, 70 Ship St. This facility is directed by a PhD-level research investigator and employs a full time facility manager and research technician to perform the technical work. Services provided include pronuclear injection of DNA into fertilized eggs, injection of gene targeted embryonic stem cells into blastocysts, and embryo cryopreservation. The individual investigators are responsible for genotyping, husbandry, and breeding of generated mouse strains. Facility instrumentation includes a Nikon SMZ1500 dissection microscope, a Nikon Eclipse TE200 inverted microscope, equipped with Eppendorf Transferman NK2 micromanipulators and an Eppendorf FemtoJet microinjector, a Nikon Eclipse TS100 inverted microscope for cell culture use, a Nikon SMZ800 surgical microscope, and a CBS V1500AB isothermal liquid nitrogen storage system. This facility has received partial support from the National Institutes of Health (NIGMS Grant No. 8P30GM103410) and the Division of Biology and Medicine and the Provost’s Office, Brown University.

Proteomics: Laboratories for Molecular Medicine, 70 Ship Street. The proteomics facility is directed and staffed by a PhD level scientist with technical know-how of numerous instrumentation platforms and bioinformatics analytical tools. Mass spectrometry and protein analysis using the Thermo Scientific QExactive or the Thermo LTQ Orbitrap Velos instruments is the central focus of this facility. Other facility instrumentation includes a Jasco J-815 Circular Dichroism Spectropolarimeter, MicroCal VP Differential Scanning Calorimeter, a MicroCal Isothermal Titration Calorimetry (ITC) 200, HORIBA Jobin Yvon FluoroMax-4 Spectrofluorometer, a GE Healthcare AktaPrime Plus Protein Purifier, an Eksigent 2D+ ultra-
high pressure liquid chromatography system (UHPLC), an Agilent 1200 HPLC, a GE Healthcare Biosciences Biacore X 100 and a Minifors fermenter. Proteomic analysis software tools include Matrix Science Mascot, Bioinformatics Solutions PEAKS Studio, Thermo Scientific Proteome Discoverer and ProSight PC, NuSep ProteoIQ, and Proteome Software Scaffold Q+S. This facility has received partial support from the National Science Foundation (EPSCoR Grants Nos. 0554548 and 1004057), the National Institutes of Health (NCRR Grant No. S10RR020923), a Rhode Island Science and Technology Advisory Council grant, and the Division of Biology and Medicine and the Provost’s Office, Brown University.

- **Rhode Island BioBank**: Biomedical Center, 171 Meeting Street. This facility is directed by a Ph-D level investigator and managed by a full time Laboratory Manager. The facility which is open to campus faculty and hospital based clinicians provides a secure, state of the art biorepository to store human biological samples. In addition, the facility houses an extensive neurodegenerative disease brain tissue collection which provides tissue and age matched controls to investigators. Facility equipment includes (4) -80°C Freezers, (3) 4°C refrigerators, and (2) Taylor Warton Liquid Nitrogen freezers each capable of holding 40,000 1ml samples. All equipment is connected to back-up generator power and monitored 24/7 by a Rees alarm system. Freezerworks biospecimen inventory software is used for sample tracking. This facility receives support from the Division of Biology and Medicine, Brown University.

- **Rodent Behavioral Phenotyping**: Biomedical Center, 171 Meeting St. This facility is a fully-automated high-throughput rodent behavioral testing facility. It is unique in that it integrates high-level computer vision, computer learning, and custom built hardware solutions with behavioral testing to automate tracking, cataloging, and analysis of both home cage behavior and standard rodent testing paradigms to characterize preclinical models of disorders, test novel pharmacological and genetic rescue strategies in rodent models, and conduct basic scientific research. The core is composed of a workroom with 4 workstations which are connected to 4 testing rooms. Each workstation is equipped with Noldus Ethovision tracking software, and each testing rooms contains a high-definition digital video camera, independent ventilation, data links, and power outlets. These rooms can be readily linked to the in house behavioral monitoring system. This facility also has independent housing rooms dedicated for mice undergoing behavioral testing, which are located adjacent to the testing rooms. In the housing corridor there are two housing bays dedicated to the chronic monitoring of rodent homecage behavior (up to 40 cages). Located adjacent to homecage monitoring rooms are “server rooms”, which contain servers that transmit data to CCV for processing. This system is maintained on independent power with battery and backup and it provides a buffering system to store videos in the event of down time or loss of connection with CCV. This approach allows for continuous monitoring of mice even in the event of loss of power or connection to CCV for a period of ~140 hours. Finally, the facility has access to a barrier facility to house and maintain large numbers of breeders, the offspring of which will be transferred to the behavior core 5-7 days prior to beginning testing.

- **Structural Biology**: Laboratories for Molecular Medicine, 70 Ship Street. Structural Biology: Laboratories for Molecular Medicine, 70 Ship Street. The Structural Biology Facility is directed by two PhD level scientists and managed by a PhD level scientist and houses instruments for NMR spectroscopy and X-ray crystallography. The NMR instrumentation includes Bruker 500 MHz AVANCE II Ultrashield and 850 MHz AVANCE III ASCEND spectrometers equipped with TCI HCN Z-gradient cryoprobes. The 850 MHz magnet additionally has a Nitrogen Liquefier extension and SampleMAIL automated delivery system for maximum ease of use. TXI HCN room-temperature probes are also available. Both spectrometers are operated by Linux workstations running TopSpin 3.1. For crystallographic research, the facility includes a Rigaku FR-E+ Superbright rotating anode X-ray generator. One side of the instrument is set up for single-crystal diffraction with a Saturn 944 HG CCD and an ACTOR robotic mounting system to allow for automatic screening of up to 80 crystals in a single run. The other side of the instrument includes a state-of-the-art BioSAXS-1000 system for collecting small-angle X-ray scattering data using a Pilatus detector. Linux workstations are available for crystallographic data reduction and structure determination (available programs include HKL-3000, CCP4, and CNS). This facility has received support from the Division of Biology and Medicine and the Provost's Office, Brown University.

- **X-ray Reconstruction of Moving Morphology**: Biomedical Center, 171 Meeting St. X-ray Reconstruction of Moving Morphology (XROMM) is a 3D imaging technology for visualizing rapid skeletal movement in vivo. XROMM combines 3D models of bone morphology with movement data from biplanar x-ray video to create highly accurate re-animations of the 3D bones moving in 3D space. Rapid bone motion, such as during bird flight, frog jumping and human running, can be visualized and quantified with XROMM. The facility is directed
by a PhD level scientist and staffed by a technician. Facility instrumentation includes mobile C-arm OEC 9400 Fluoroscopes and a Biplanar X-ray room containing 2 Varian model G-1086 X-ray tubes, 2 EMD Technologies model EPS 45-80 pulsed X-ray generators, 2 Dunlee model TH9447QQXH590 image intensifiers (16” diameter), and 2 Phantom v10 high-speed digital video cameras. The facility also has a veterinary Animage Fidex CT Scanner, a CT scanner designed for animals in the size range from rats to dogs. In vivo scanning of anesthetized animals is possible. This facility has received partial support from The W.M. Keck Foundation for the development of bplanar videoradiography hardware and for support of the interdisciplinary collaborative development of XROMM software, the Rhode Island Hospital Orthopaedic Foundation, the Bushnell Research and Graduate Education Fund, the Instrument Development for Biological Sciences Program at the US National Science Foundation and the Division of Biology and Medicine, the Office of the Vice President for Research at Brown University and the Provost’s Office, Brown University.

BROWN INTERNAL FUNDING MECHANISMS

The Brown Biomedical Innovations Fund: Launched and implemented in partnership with Brown’s Technology Ventures Office, the fund is the first program of Brown Biomedical Innovations, Inc., created by Dr. Jack A. Elias, Dean of Medicine and Biologic Sciences, as part of a strategic plan to enhance Brown’s approach to translational research — the practice of ensuring that breakthroughs in basic research reach the point where they can make a meaningful medical difference for patients, and that urgent scientific questions identified in the clinic or among patient populations become research priorities in the lab. This fund seeks to turn biomedical advances in the lab into innovations that reach patients through the marketplace is a proof-of-concept stage of funding that allows researchers to explore, develop and demonstrate the value of their ideas for potential investors and industry partners. Awards provide up to $100,000 in funding. The goal of this funding program is to guide more of Brown’s research toward commercialization. The new fund is supported by gifts from two donor couples: Brown parents Wes and Lynn Edens, and alumni and parents Drs. Mark and Recia Kott Blumenkranz.

The Richard B. Salomon Faculty Research Awards Fund Guidelines: Designed to recognize excellence in scholarship, the Richard B. Salomon Faculty Research Awards fund exceptional faculty research projects. From 1995 to 1999, the program was funded by the bequest of the late Richard B. Salomon, Chancellor of Brown University. Since 1999, the University has continued to fund this program. Any Brown faculty member whose research is administered through Brown is eligible. Emeritus, adjunct, and visiting faculty, as well as post docs, are not eligible to apply. Grants of up to $15,000 are awarded for one year. These are meant as research development grants and may not be renewed.

Research Seed Funds are intended to support activities necessary to advance competitive research proposals, such as performing preliminary work and facilitating collaboration. It is expected that a competitive proposal for a sizable project will be submitted to an external funding organization within a year of the completion of the Research Seed Fund period. There are two categories of awards. Category 1 awards can be up to $50,000 and Category 2 awards can be up to $100,000 for a group of two or more PI’s from distinctly different disciplines who are initiating a new collaboration with the goal to establish an ongoing, long-term connection across disciplines leading to external research funding.

Teaching Relief Funds are available for investigators involved in the preparation of substantial grant proposals. This opportunity is offered only for “substantial” grants, which involve millions of dollars in funding and require collaboration of large teams that often span multiple universities. The definition of “substantial” will vary across fields but includes NSF Engineering Research Centers, NSF Expeditions in Computing Program, NSF Science Technology Centers, DoD MURI Program, NIH U01 and P01 Programs, and major foundation awards in the humanities, which often involve establishing a new program across multiple departments. Teaching relief can be for a full semester (full relief) or half a semester (partial). In the case of half a semester, the course could be co-taught with another faculty such that division of labor is cleanly divisible across the semester, or the course could be compressed in the first half of the semester to provide relief in the latter half, if the nature of the course and the timing of the proposal submission permits.

BROWN RESEARCH ADMINISTRATIVE RESOURCES
The Biomedical Research Administration (BMRA) and the Brown University Office of Sponsored Projects (OSP) support Brown University faculty in the acquisition, performance and administration of projects and programs funded from sources outside the University. The primary functions of this office include:

- **Pre-Award** – Reviewing proposals prior to submission for compliance with University and sponsor polices, guidelines and procedures, negotiating terms and conditions of contracts and grants to minimize Brown’s performance, cost and compliance risk and enhance efficiency, issuing contract and grant sub awards, serving as primary liaison between the University and the funding sponsor’s contract/grant office through the life of the award, especially regarding changes to grants or contracts and, providing guidance to faculty, departments, and staff regarding issues related to proposal preparation, award terms and sponsor policies.

- **Post-Award** – Monitoring expenditures for compliance with University policies and sponsor terms and conditions and applicable cost principles, preparing financial reports and invoices, managing cash receipts, and closing out contracts and grants.

- **Property Management** – Recording and tracking asset records, managing and maintaining campus-wide inventory of all University and sponsor-funded property, identifying the availability of equipment for research use, issuing property reports to management and external sponsors, liaising with University and sponsor property auditors, and providing guidance to departments, faculty, and staff regarding issues related to property administration and inventory.

**The Office of Research Integrity (ORI)** supports the Brown University research community by providing guidance, education and resources to facilitate the conduct of ethical research in accordance with governing federal and state regulations and University policies. The ORI’s multidisciplinary team:

- Provides administrative support and regulatory advisement to the University's Institutional Review Board (IRB), Institutional Animal Care and Use Committee (IACUC), and Conflict of Interest Review Board;
- Assists researchers with adhering to requirements associated with international research collaborations, including running the University’s Export Control Compliance Program;
- Promotes integrity in research by providing training in the ethical and responsible conduct of research;
- Handles allegations of research misconduct;
- Through its Quality Assurance / Quality Improvement program, conducts outreach and education to researchers and staff regarding best practices to facilitate regulatory compliance and required institutional approvals, and performs post-approval monitoring and investigations of potential research-related non-compliance.

**SMART Institutional Review Board (IRB):** For investigators pursuing NIH funded clinical research involving multiple sites, coordination of IRB review Brown University has joined SMART IRB, a platform designed to ease common challenges and burdens associated with initiating multi-site research by leveraging a pre-negotiated master IRB Reliance Agreement. SMART IRB enables member institutions to minimize duplicative IRB review while maintaining appropriate oversight. The platform can be used for a range from large, complex clinical trials to two-site collaborations. It is also designed to provide a roadmap to implement the NIH Policy on the Use of Single Institutional Review Board for Multi-Site Research which goes into effect on September 25, 2017. As part of SMART IRB, institutions may choose to rely on another IRB to review, approve and oversee a research study: The Reviewing IRB takes on oversight responsibilities associated with that study for its duration. Relying institutions provide local information about state law, study team member training and qualifications, and conflicts of interest. Investigators and institutions retain their responsibilities for the protection of human subjects, compliance with applicable laws, regulations, ethical standards and the terms of the institution’s Federal Wide Assurance (FWA).

**The Office of Research Development** provides information, training opportunities and one-on-one support to faculty members who are planning a proposal submission with the goal of making proposals more competitive. The office assists investigators in navigating the resources and offices at Brown that are involved in proposal submission and planning ahead for various deadlines. The office has expertise to assist with federal agency proposals and will help faculty develop the non-discipline specific sections of a proposal (i.e. management plan, broader impacts, facilities descriptions). The office can provide project management for large, complex proposals.
Technology Venture Office: The Technology Ventures Office (TVO) works with faculty (at Brown, Lifespan and Care New England) to commercialize inventions created from research. TVO aims to generate revenue for inventors, the research enterprise, and the University. Brown's TVO strives to achieve these goals by fostering strategic collaborations with industry through licensing, sponsored research, and launching of new ventures. This office is responsible for assisting investigators with confidentiality, consulting and material transfer agreements, industry sponsored research, invention reporting, licensing, start-ups and research collaborations.

BROWN SUPPORT FOR INVESTIGATOR INITIATED CLINICAL TRIALS

The Brown University Oncology Research Group (BrUOG) was created in 1994 to coordinate clinical cancer research for Brown's affiliated hospitals and Alpert Medical School faculty. BrUOG's main mission is to improve cancer care through the implementation of innovative, multidisciplinary cancer clinical trials. BrUOG provides the infrastructure for the efficient development and implementation of these trials, which are created by Brown University faculty. Before BrUOG was founded, there was no unifying body for such research and no infrastructure through which Brown's myriad scientists and physicians could share, advance, and garner support for their ideas on the treatment of cancer. The founding hospitals of BrUOG are Rhode Island Hospital, The Miriam Hospital, Roger Williams Medical Center, Memorial Hospital, and Women & Infants Hospital, which administer care to the majority of trial patients today. BrUOG, however, is the engine: its administrators and physicians provide support for the initial study concept and validation of trial design, and are responsible for trial administration, safety monitoring, data analysis, and the presentation and publication of findings.

The trials sponsored by BrUOG investigate novel, cutting-edge applications of chemotherapy, biologic agents and other cancer treatments. They study anticancer agents in early development, and as such are Phase I trials (which determine the optimally tolerated dose of an anticancer treatment regimen) or Phase II trials (which assesses the potential therapeutic effectiveness). These trials provide essential preliminary data for definitive Phase III trials, often conducted under the auspices of the National Cancer Institute. BrUOG trials are unique because they are investigator-initiated—conceptualized by practicing physicians, not by pharmaceutical companies. As such, these trials represent an incredibly important sector of cancer research. Because medical, radiation and surgical oncologists are deeply familiar with both the latest research and stark realities of cancer, they are an unrivaled source of ideas for novel approaches to treatments.

The Brown University Oncology Research Group (BrUOG) is the principle mechanism for oncology clinical trials at the Alpert Medical School. This regional consortium of Brown-affiliated hospitals allows hematologists, oncologists, surgeons, radiation oncologists, pathologists, and others to develop investigator-initiated clinical trials. These studies are conceived and designed by faculty at member institutions. They provide cutting-edge applications of chemotherapeutic agents, biologic agents, and other treatment modalities. Such innovative studies lay the groundwork for larger nationwide studies under the auspices of cooperative clinical trials groups. Clinical trials are available for a broad range of disorders in hematology/oncology and these include treatment for cancers of the breast, brain, lung, gastrointestinal tract, skin, and prostate as well as trials in leukemia and lymphoma. Many of these trials utilize novel therapeutic agents or new combinations of treatments in an effort to improve treatment. BrUOG is one of the foremost clinical oncology research groups in the country. Accomplishments include:

- **Non-Small Cell Lung Cancer (NSCLC):** BrUOG performed the sentinel Phase I and Phase II studies of paclitaxel/carboplatin/radiation therapy in NSCLC, which has formed the basis for the standard of care throughout the world for treatment of Stage 3 lung cancer. BrUOG is the leader in developing stereotactic radiation, a highly focused form of radiation for lung cancer.

- **Esophageal Cancer:** BrUOG has led the development of targeted agents in adenocarcinoma of the esophagus. Two current Phase III studies of the National Cancer Institute—investigating trastuzumab and cetuximab—were each based on BrUOG Phase I/II trials.

- **Rectal Cancer:** BrUOG is leading the development of chemotherapy and radiation before surgery to prevent local recurrence and to reduce the need for colostomy.

- **Breast Cancer:** BrUOG has concentrated on two important areas in breast cancer. For patients with metastatic breast cancer, BrUOG is developing more effective, less toxic and more convenient regimens. BrUOG has also been a leader in the development of neoadjuvant chemotherapy treatment given prior to definitive breast surgery to reduce recurrence and the need for mastectomy.
• Pancreatic Cancer: BrUOG has developed more influential Phase I and II pancreatic cancer studies leading directly to Phase II and III cooperative group trials than any other cancer group in the world.
• Brain tumors: BrUOG is leading the development of new radiation sensitizers to treat glioblastoma, the most lethal primary brain tumor.
• Education: BrUOG teaches the fundamental of clinical cancer research and provides outstanding research opportunities for physicians in training.

In addition to protocols coordinated by BrUOG, patients at the affiliated hospitals also have access to a large variety of other clinical trials through national cooperative groups such as Cancer and Leukemia Group B (CALGB), the National Surgical Adjuvant Breast and Bowel Project (NSABP) and the Radiation Treatment Oncology Group (RTOG). Only through the resources of such large organizations can such randomized trials of cancer therapy take place. Pharmaceutical industry-sponsored trials of novel agents are also available. Sponsorship for clinical trials is derived from the National Cancer Institute and from numerous pharmaceutical industry sponsors.