<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTE TO USERS</td>
<td>1</td>
</tr>
<tr>
<td>CAREER DEVELOPMENT</td>
<td>1</td>
</tr>
<tr>
<td>Early Career Faculty</td>
<td>1</td>
</tr>
<tr>
<td>Individual Development Plans</td>
<td>3</td>
</tr>
<tr>
<td>LIBRARY RESOURCES</td>
<td>4</td>
</tr>
<tr>
<td>George T. Harrell Library</td>
<td>4</td>
</tr>
<tr>
<td>GENERAL DESCRIPTIONS</td>
<td>4</td>
</tr>
<tr>
<td>Penn State College of Medicine</td>
<td>4</td>
</tr>
<tr>
<td>Penn State Hershey Medical Center</td>
<td>5</td>
</tr>
<tr>
<td>Penn State Research Expenditures &amp; Rankings</td>
<td>7</td>
</tr>
<tr>
<td>University Park Regional Campus</td>
<td>7</td>
</tr>
<tr>
<td>RESEARCH ADMINISTRATION</td>
<td>8</td>
</tr>
<tr>
<td>Office of Research Affairs (ORA)</td>
<td>8</td>
</tr>
<tr>
<td>Office of Technology Development (OTD)</td>
<td>8</td>
</tr>
<tr>
<td>Research Development</td>
<td>8</td>
</tr>
<tr>
<td>Research Concierge Service (RCS)</td>
<td>8</td>
</tr>
<tr>
<td>RESEARCH SUPPORT</td>
<td>9</td>
</tr>
<tr>
<td>Animal Use &amp; Veterinary Care</td>
<td>9</td>
</tr>
<tr>
<td>Biorepository</td>
<td>9</td>
</tr>
<tr>
<td>Electronic Medical Records (EMR)</td>
<td>9</td>
</tr>
<tr>
<td>Investigational Drug Service (IDS)</td>
<td>9</td>
</tr>
<tr>
<td>Laboratories</td>
<td>10</td>
</tr>
<tr>
<td>REDCap (Research Electronic Data Capture)</td>
<td>10</td>
</tr>
<tr>
<td>Section of Research Resources</td>
<td>11</td>
</tr>
<tr>
<td>CORE FACILITIES - Penn State Hershey</td>
<td>11</td>
</tr>
<tr>
<td>INSTITUTES AND CENTERS</td>
<td>13</td>
</tr>
<tr>
<td>Center for NMR Research (CNMRR)</td>
<td>13</td>
</tr>
<tr>
<td>Center for Pediatric Cardiovascular Research</td>
<td>14</td>
</tr>
<tr>
<td>Clinical Research Center</td>
<td>14</td>
</tr>
</tbody>
</table>
Penn State Center for Women’s Health Research ................................................................. 14
Penn State Clinical and Translational Sciences Institute (CTSI) ................................................ 15
Penn State Hershey Clinical Simulation Center ................................................................. 15
Penn State Hershey Eye Center ......................................................................................... 16
Penn State Hershey Inflammatory Bowel Disease Center (IBD Center) ............................... 16
Penn State Hershey Melanoma Center .............................................................................. 17
Penn State Heart and Vascular Institute (PSHVI) ............................................................. 17
Penn State Bone and Joint Institute .................................................................................. 18
Penn State Hershey Cancer Institute ............................................................................... 18
Penn State Hershey Institute for Personalized Medicine (IPM) ......................................... 18
Penn State Hershey Neuroscience Institute ....................................................................... 19
Institute for the Arts & Humanities ..................................................................................... 19
Institute for Cyberscience ................................................................................................. 19
Institutes of Energy & the Environment ............................................................................. 19
Materials Research Institute (MRI) .................................................................................. 19
Rock Ethics Institute ............................................................................................................ 20
Social Science Research Institute (SSRI) ........................................................................... 20
The Huck Institutes of the Life Sciences ............................................................................. 21
NOTE TO USERS
The Research Concierge Service (RCS) compiled this boilerplate language as a service to the Penn State Hershey research community. This document provides descriptions of research resources and infrastructure that may be incorporated into funding proposals. The RCS makes every effort to keep this document updated. That said, if a principal investigator plans to incorporate a specific core facility, institute, center, etc. within his/her research proposal, he/she is advised to work directly with the collaborating unit to modify the boilerplate language as needed to ensure that the language speaks to the specific aims of their research project.

CAREER DEVELOPMENT

Early Career Faculty

Several professional development opportunities of varied purpose and intensity are available to early career faculty at Penn State Hershey.

New Faculty Orientation offers lunch time speed networking opportunities with institutional leaders from research, education, clinical service, and outreach.

The Office for Support in Learning and Teaching Excellence offers workshops on teaching strategies and new methods as well as observation and one-on-one consulting sessions.

The Junior Faculty Development Program (JFDP) offers a holistic curriculum that serves as a model for faculty professional development programs nationwide. Each year, the program runs from September to May, with 2-hour sessions each Friday morning. Sessions are led by senior faculty members or experts from other institutions. The JFDP consists of two components: (1) a comprehensive curriculum that includes topics on research, education, clinical practice, and academic/career development and (2) a scholarly project completed under the guidance of a senior faculty mentor assigned by the Program. Through written agreement, Department chairs must approve the junior faculty member’s participation in the JFDP and must also approve their proposed project. Participation in JFDP requires approximately 4 hours per week, including class time.

In addition to the JFDP, the College of Medicine offers Grants Academy, an 8-month, structured non-credit program designed to assist faculty with the preparation and submission of an investigator-initiated grant proposal. Participation in Grants Academy requires approximately 10 percent release time. Meetings of Grants Academy are held once a month (generally the first Thursday of the month from 7:30 a.m. to 9 a.m.) from October through April. Participants are required to complete a considerable amount of out-of-class work and once enrolled, are expected to be active participants. Each meeting is accompanied by the required submission of a component of the final grant application. Class sizes are kept small (10-15 persons) to facilitate team-based learning.

For early career faculty who need a period of mentored research and training in order to transition to research independence, the College of Medicine offers the Research Career Development Grants workshop series. Offered every two years, this workshop series provides participants the tools needed to craft a competitive mentored career award (e.g. NIH “K”)
Senior faculty lead the workshop series, which navigates all stages of preparing a mentored “K” proposal, including how to identify the “best fit” funding mechanism, how to develop an integrated research strategy and career development plan, how to select the best mentors, and what to expect from the review process.

Historically, junior faculty at Penn State Hershey have had access to two institutional K programs dedicated to the mentorship of junior faculty – the Building Interdisciplinary Research Careers in Women’s Health (BIRCWH) Program and the KL2 Scholars Program. Established in 2007, the BIRCWH Program embraces multiple colleges on two Penn State campuses - Hershey and University Park. BIRCWH scholars come from multiple disciplines, but are united by their scholarly research in the field of women’s health and understanding sex/gender differences relevant to human health. The BIRCWH Program created a successful cross-campus mentoring model that was expanded in 2011 with the rollout of the KL2 Program, which is supported by the Penn State Clinical and Translational Science Institute (Penn State CTSI). The KL2 Program is also a cross-campus program, but is specifically geared toward junior faculty who want to pursue an academic career in clinical and/or translational research. Together, the BIRCWH and KL2 programs co-sponsor a monthly “K Community” seminar series that is open to faculty members who are funded through an institutional K award or an individual K award. The seminar series is also open to faculty mentors.

The “K Community” Seminar Series supported by the Penn State BIRCWH and KL2 programs was founded in 2007 by the BIRCWH Program and subsequently expanded in 2011 to include Penn State CTSI KL2 recipients and individual K-awardees. Monthly seminars take place on the first Monday of each month for 2 ½ - 3 hours. Reflecting the multidisciplinary nature of the K scholars and their mentor teams, the seminar series alternates between the University Park campus and the Hershey campus. Each session includes a networking lunch and a formal presentation by an internal or external speaker that is selected by the K awardees. These presentations provide an opportunity for K awardees to expand their professional networks by inviting experts in their fields from other universities to visit Penn State. Seminar sessions are either a scientific talk or a professional development topic. Professional development topics have included strategies for effective time use, preparation of NIH resubmission applications, preparation of PCORI grants, promotion and tenure issues, and internal resources for pilot project funding and grant preparation. The seminar series also provides an opportunity for K awardees to present their own research and to “workshop” draft manuscripts, posters, or grant applications. In workshop sessions, K awardees receive constructive feedback from their peers on works in progress. These workshop sessions have received overwhelmingly positive evaluations by K awardees due to the benefits of receiving feedback in a supportive, multidisciplinary context.

The Junior Faculty Research Scholar (JFRS) Award is unique to Penn State Hershey and specifically, the College of Medicine. Internal funds are used to support the JFRS Award - a competitive mechanism that receives, on average, 22 to 27 applications each year. The College of Medicine awards up to 4 investigators $200,000 over a two-year period for a research project and complementing career development plan.

In addition to formal programs and funding mechanisms, the College of Medicine’s Office of Faculty and Professional Development, in collaboration with the Penn State CTSI and other Penn State institutes, routinely sponsors workshops on topics like time management, negotiation, conflict management, unconscious bias, team science and leadership. Increasingly, both formal and informal programs take advantage of the ability to videoconference to the University Park campus.
In November 2013, the Office of the Vice Dean for Research and Graduate Studies at the College of Medicine, in collaboration with the Penn State Clinical and Translational Sciences Institute (Penn State CTSI), established the Research Concierge Service (RCS) to help investigators at all career stages and in all disciplines pursue extramural funding for research. The RCS enhances the research development infrastructure at the College of Medicine by working with investigators to identify strategic funding opportunities, to build and nurture transdisciplinary research teams, to provide editing and writing support, and to guide the development of multi-investigator proposals. The RCS’ overarching goal is to improve the quality and increase the number of extramural funding submissions. The RCS has a full FTE administrator and a Director of Interdisciplinary Research who guides the service area and also assumes the role of Director of Research Development. The RCS maintains a website that provides timely and robust guidance for finding funding, identifying collaborators, and developing proposals for external submission.

The College of Medicine is leading the effort to establish a research concierge paradigm that can be replicated at other Penn State campuses as a vehicle for increasing the efficiency of connecting potential research collaborators, mentors, and reviewers.

**Individual Development Plans**

On July 23, 2013 the National Institutes of Health (NIH) issued a notice (#NOT-OD-13-093) regarding required components of annual progress reports, which are required of institutions that receive research grants or cooperative agreement awards. Annual progress reports, commonly referred to as RPPRs (Research Performance Progress Reports) are a federal mandate. The NIH uses RPPRs to document grantee accomplishments and compliance with the terms of their award. #NOT-OD-13-093 modifies the RPPR by requesting a statement from the institution regarding Individual Development Plans (IDPs) for all graduate students and postdoctoral scholars supported by any NIH grant. IDPs are strongly recommended for all graduate students and postdoctoral researchers supported by NIH funding. This new NIH policy does not require IDPs be included within submitted RPPRs, but it does require that the RPPRs include a statement outlining current practices being used by the institution. Institutions are encouraged to begin reporting IDPs in all RPPRs submitted on or after October 1, 2014.

Since the Fall of 2013, the College of Medicine has implemented a policy that requires all graduate students and postdoctoral scholars to prepare IDPs – regardless of the source of their funding support - to assist investigators with this new NIH reporting requirement, the Vice Dean for Research & Graduate Studies has made the following boilerplate language available for inclusion in RPPRs:

**Boilerplate Language for RPPRs:**

Each year, all College of Medicine doctoral students and postdoctoral scholars will prepare or update an Individual Development Plan (IDP). This Plan will include at least one activity to be undertaken over the upcoming academic year in support of the trainee’s career development. The trainee is expected to update the IDP and submit for review to his/her advisor prior to the start of the academic year. Thesis advisors and advisors of postdoctoral scholars are expected to review the IDP with the trainee and both parties are expected to agree on a set of career development activities.
LIBRARY RESOURCES

George T. Harrell Library
All faculty, staff, and medical and graduate students at Penn State Hershey have free unlimited access to the Harrell Health Sciences Library (HHSL) resources. HHSL collections and services support the informational needs of Penn State Hershey users engaged in patient care, research, and education, including interlibrary loan, search services, and instruction. The HHSL currently employs 8 faculty librarians who hold, at minimum, a Master’s degree from an American Library Association accrediting library program. Full time and part time staff are also employed by HHSL. Library faculty teach literature searching, information literacy, basic database search skills, evidence-based medicine and bibliographic software programs (e.g. Endnote) in course integrated instruction or workshops to all members of the Penn State Hershey community. A suite of services and training opportunities are available as requested or on a recurring basis. The HHSL is part of Penn State University Libraries, allowing Penn State Hershey members access to more than 6.9 million books, almost 400,000 E-books, 110,000 online full-text journals and 706 databases (2014/2015 data). The Libraries are increasingly electronic, allowing 24 hour access from anywhere. Most digital platforms are compatible with mobile devices. Penn State provides access to many of the major scientific journals, highly used scholarly databases and point of care clinical tools. The HHSL hosts 30 public computer workstations, a 24 hour computer lab, a 24 hour study room and 2 group study rooms. Printers, scanners and copiers are available for patron use. The first floor of the library includes a mix of furniture including study carrels, group study tables, sofas and armchairs. The second floor houses the 24 hour study room and computer lab and consists of study carrels. The HHSL is slated to begin renovations in Fall 2015 to add group study rooms, a one button studio for presentation recording and a technology sandbox for experimentation with emerging technologies including new software and 3-D printing. The HHSL is open every day except major holidays with the 24 hour study room and computer lab available at all times.

GENERAL DESCRIPTIONS

Penn State College of Medicine
The Penn State College of Medicine is one of the country’s leading medical schools. It is comprised of 24 academic departments – 8 basic science departments and 16 clinical departments – that collectively contribute to an annual portfolio of nearly $100 million in funded research. The College is located on the 550-acre campus of Penn State Hershey Medical Center – one of the country’s leading teaching and research hospitals. The College of Medicine and the Medical Center are partners in a fully integrated health system. Both institutions share a common leader who serves as both Chief Executive Officer and Dean. This progressive leadership structure provides a fertile environment for faculty physicians to integrate the latest biomedical knowledge across all mission areas – clinical care, research, education, and community service. The College and Medical Center have celebrated many accomplishments, including numerous national “firsts” in education, medical treatment, and research:

- The first medical school to develop a Department of Humanities (the focus on humanities remains an essential component in training students to become compassionate physicians);
- The first medical center to develop an independent Department of Family and Community Medicine and a family and community residency
The first researchers to discover a gene that suppresses the metastasis of melanoma; 
The first scientists to map the gene for hemochromatosis, the most common genetic disorder in the United States; and 
The first surgeons to perform a robotically assisted heart bypass on a patient.

Physicians employed at the Medical Center hold academic appointments at the College and many College faculty members have close working relationships with clinicians at the Medical Center. The College is one of 16 colleges within Penn State University, a research-intensive institution that consistently ranks among the top 20 U.S. academic institutions in research.

Established in 1963, the College of Medicine is a leading biomedical science institution, with an annual portfolio of nearly $100 million in funded research. In FY 2014 (July 1, 2013-June 30, 2014) the College of Medicine was awarded $83.4 million in sponsored research awards, which include federal, state, and private agencies, businesses, and individual donors. Approximately 65% of the $83.4 million in sponsored research was funded by the National Institutes of Health (NIH).

The College of Medicine is one of the country's leading medical schools. Graduate programs at the College of Medicine are highly competitive. Nearly 1 in 7 applicants to U.S. medical schools apply to its graduate program, which had more than 7,100 people compete for 145 available openings in the Class of 2016. The College boasts more than 900 faculty members – roughly 700 in clinical departments and 200 in basic science departments. The Medical Center sponsors 60 training programs accredited by the Accreditation Council for Graduate Medical Education (ACGME) to more than 500 residents and fellows each year. Collectively, the College and Medical Center employ more than 9,000 people and support a combined annual operating budget of $1.6 billion.

Doctoral students at the College of Medicine choose research programs led by one of approximately 200 graduate faculty members in one of 8 basic science departments and 16 clinical departments. The College of Medicine offers Ph.D. programs in anatomy, biomedical sciences, and biostatistics and, in conjunction with faculty colleagues on the University Park Campus, offers PhD programs in physiology and in neuroscience. The College of Medicine also offers a Master's in Public Health, an M.S. in Public Health Sciences (a clinical research training program) and a postdoctoral program leading to an M.S. degree in Laboratory Animal Medicine, the only such program in the Commonwealth. Within the core programs, residents must complete at least one research project and can select among several tracks in support of a clinician-scientist career. Fellowship programs have similar flexibility to tailor an individual’s curriculum to clinical or non-clinical research. Graduate programs at the College are highly competitive. Nearly 1 in 7 applicants to U.S. medical schools apply to the graduate program, which had more than 7,100 people compete for 145 available openings in the Class of 2016. Since enrolling its first class in 1967, the college has graduated more than 4,000 physicians and more than 1,000 scientists with Ph.D. or M.S. degrees. In addition, more than 2,770 resident physicians have been trained in medical specialties at Penn State Hershey Medical Center. In 2012, the College received its first cohort of 13 medical students to the new Regional Medical Campus in University Park, which focuses on preparing medical students for careers in primary care and rural medicine, with a concentration on Pennsylvania's northern tier region [1].

1 http://news.psu.edu/story/148180/2012/06/29/university-park-regional-medical-campus-welcomes-first-students

Penn State Hershey Medical Center
Founded in 1963 through a gift from The Milton S. Hershey Foundation, the Penn State Hershey
Medical Center is one of the country’s leading teaching and research hospitals. It is the only hospital in central Pennsylvania with a Level 3 intensive care unit and the only hospital in the state to be accredited as both an adult and pediatric Level I Trauma Center. The facility draws patients from a 27-county catchment area that includes more than 1.9 million people and several federally designated medically-underserved areas. In addition, it is a quaternary care referral center for Pennsylvania and neighboring states, with a referral base of more than 2.5 million people. This large referral base provides an ideal platform for researchers to examine novel diagnostic and therapeutic procedures to treat a diverse range of acute and chronic diseases. In fiscal year 2013, the Medical Center admitted more than 27,700 patients, logged more than 67,000 emergency room visits, treated more than 910,000 outpatient visits, and performed in excess of 27,700 surgical cases [1]. In 2012, it was awarded re-designation as a Magnet hospital by the American Nurses Credentialing Center (ANCC) – a designation that is conferred on fewer than 7 percent of all U.S. hospitals [2]. The Medical Center anchors a 550-acre health campus that includes a 400-bed tertiary care facility, a 151-bed children’s hospital, and the region’s only comprehensive cancer center.

In recent years, the Medical Center greatly enhanced its capacity to provide advanced pediatric and cancer care with the construction of two new, free-standing facilities – a children’s hospital and a cancer institute. The Penn State Hershey Cancer Institute (PSHCI) now has 143 investigators from 25 academic departments in 6 colleges located at the Hershey and University Park campuses of Penn State University. Its services include surgery, radiation, and medical (chemotherapy) and its scientific programs focus on: Cancer Virology and Immunology, Mechanisms of Carcinogenesis and Chemoprevention, Cancer Control and Population Health, and Experimental Therapeutics.

PSHCI has been named a Blue Distinction Center for Complex and Rare Cancers (SM) by Highmark Blue Shield and treats nearly 3,000 new cancer patients each year. A distinctive feature of PSHCI is the pediatric hematology/oncology department where dedicated oncology specialists in pediatric oncology focus on pediatric malignancies, leukemia, solid tumors, and a host of other diseases. Its pediatric researchers are leaders in steering committees and other cooperative groups dedicated to finding treatments and cures for pediatric oncology, including their involvement with Children’s Oncology Group (COG). The Institute also works collaboratively with Penn State Hershey Neurosurgery to serve brain and spine tumor patients, and with Penn State Hershey Breast Center to serve breast cancer patients. The Penn State Hershey Breast Center is the only nationally accredited breast center in central Pennsylvania, and is designated as a Breast Imaging Center of Excellence [3].

The Children’s Hospital opened to inpatients in February 2013 and is the only free-standing children’s hospital in central Pennsylvania. The hospital is staffed by more than 150 pediatric medical and surgical specialists who support advanced clinical and basic research on childhood illnesses [4]. The Children’s Hospital is the only hospital in the region to perform bone marrow stem cell and kidney transplants for pediatric patients. It also has the only fully equipped and staffed academic level IV Neonatal Intensive Care Unit (NICU) between Pittsburgh and Philadelphia. In its first year of operation, the hospital logged more than 150,000 pediatric outpatient visits and more than 4,500 discharges. Penn State Hershey Medical Group is a growing multi-specialty practice that employs more than 900 clinicians affiliated with the Medical Center. Physicians treat patients at 58 clinic sites located throughout central Pennsylvania.

1. [http://www.pennstatehershey.org/c/document_library/get_file?uuid=f8fc47f1-8474-4926-a9a5-066ad1b00d7c&groupid=10100](http://www.pennstatehershey.org/c/document_library/get_file?uuid=f8fc47f1-8474-4926-a9a5-066ad1b00d7c&groupid=10100)
2. [http://www.pennstatehershey.org/web/nursing/home/magnet](http://www.pennstatehershey.org/web/nursing/home/magnet)
3. [http://www.pennstatehershey.org/web/cancer/research](http://www.pennstatehershey.org/web/cancer/research)
Penn State Research Expenditures & Rankings

Penn State University is one of the leading research universities in the United States. The University’s latest Annual Report of Research Activity (July 1, 2014 – June 30, 2015) shows that the University spent $801 million on research in fiscal year 2015. Fiscal year 2015 marked the fifth consecutive year research spending topped the $800 million mark. The College of Medicine accounted for $94.6 million – approximately 12% - of all University research expenditures in FY 2015.

The National Science Foundation (NSF) collects R&D data from 900+ academic institutions through its annual Higher Education Research and Development (HERD) Survey. The HERD Survey consistently ranks the University in the Top 20 for research and development (R&D) expenditures. In fiscal year 2012, the latest year for which data is available, the University’s R&D expenditures exceeded $797 million, earning it a rank of 18 among the 907 research institutions that participated in the Survey.

The Center for World University Rankings (CWUR) currently ranks the University in the Top 50 among 1,000 research institutions across the globe. This impressive world ranking was determined from objective leading indicators of academic performance, including alumni employment, faculty honors/awards, publications, and patents.

University Park Regional Campus

Established in 2011, the University Park Regional Campus of the Penn State College of Medicine is located in State College, Pennsylvania adjacent to the University Park campus – Penn State’s flagship campus. The primary mission of the regional campus is to create an educational environment for training the next generation of healthcare providers and to improve access to patient-centered, high quality, cost-effective health care for local residents. This regional medical campus is being developed on 165 acres of land owned by Penn State and the Mount Nittany Medical Center, a 260-bed acute care facility offering medical, surgical, diagnostic, and community services to help patients reach their healthiest potential.

One of the region’s top places to work, Mount Nittany Medical Center employs about 2,200 skilled healthcare professionals and support staff and credentials hundreds of employed and non-employed physicians in more than 60 specialties and subspecialties. On January 2011, the corporate structure of Mount Nittany Medical Center transitioned from a hospital-based entity into a system organization. It also announced a major renovation and expansion of the Emergency Department, the construction of a comprehensive Cancer Pavilion, and the addition of 51 physicians to its physician group. Today, Mount Nittany Health has emerged as a regional health system that includes a parent organization, Mount Nittany Health, along with Mount Nittany Medical Center and Mount Nittany Physician Group, a practice with more than 120 healthcare providers, across 20 specialties, located in 15 convenient locations throughout the region as well as its fundraising and development entity, The Foundation of Mount Nittany Medical Center. In July 2012, the Regional Campus welcomed its first group of medical students to begin their core clinical training, in collaboration with local Penn State Hershey faculty, Mount Nittany Medical Center faculty and other medical providers in the community. Thirteen College of Medicine students started their third year of medical education in State College with an orientation session held at Mount Nittany Medical Center. The regional campus will eventually train as many as 48 College of Medicine students each year, with 24 in each of the third- and fourth-year medical classes. Some of these students may select to enroll in dual-degree programs as well, through the Smeal College of Business and other programs. Core clinical
rotations include family medicine, primary care, surgery, OB/GYN, pediatrics, neurology, psychiatry and medicine.

**RESEARCH ADMINISTRATION**
Several offices at Penn State Hershey work with investigators to facilitate collaborative research, to improve the competitiveness of research proposals, and to strengthen the institution’s portfolio of basic, clinical, and translational research.

**Office of Research Affairs (ORA)**
The Office of Research Affairs (ORA) at Penn State Hershey works with investigators to promote, foster, and sustain excellence in basic and clinical research. Major services include assisting researchers and staff with all pre and post-award activities, including budget and grant development, cost recovery, compliance, institutional reporting, and training mandates. Dr. Sheila Vrana, Associate Dean for Research, heads the Office of Research Affairs.

**Office of Technology Development (OTD)**
The Office of Technology Development (OTD) serves Penn State Hershey and the scientific community to establish the campus as a nationally recognized academic medical center for commercialization and translational research. OTD is focused on fostering innovative research leading to new products and services to benefit society; building strong industry partnerships between our faculty and the business community; providing educational programming focused on entrepreneurship, innovation and commercialization; and contributing to the entrepreneurial ecosystem and economic development of the region. The OTD accomplishes this by serving as an efficient and effective conduit for the transfer of promising Penn State Hershey technologies to industry; contributing to regional economic development by engaging the innovation ecosystem stakeholders and supporting new venture creation; and encouraging greater collaboration between academia and industry. Dr. Joseph Jilka, Ph.D. the Associate Dean for Research Innovation, serves as Director of OTD.

**Research Development**
Research Development helps strengthen sponsored research at the Penn State College of Medicine. Operating under the Office of the Vice Dean for Research & Graduate Studies, Research Development works closely with other research administration offices, both at Penn State Hershey and University Park, to strengthen the environment for research through the identification and dissemination of relevant funding opportunity announcements, administering several internal grant programs that support bridge, pilot and feasibility studies to sustain the research programs of productive investigators, and coordinating the down-select process for limited submission funding applications. In 2014, Research Development assumed oversight for the Research Concierge Service (RCS), which works with individual investigators and teams of investigators to produce high-quality grant applications for submission to extramural sponsors.

**Research Concierge Service (RCS)**
The Research Concierge Service (RCS) was established in November 2013 by the Office of the Vice Dean for Research and Graduate Studies, in collaboration with the Penn State Clinical and Translational Sciences Institute (Penn State CTSI). The RCS enhances the research development infrastructure at the College of Medicine by working with investigators to identify strategic funding opportunities, to build and nurture trans-disciplinary research teams, to provide
editing and writing support, and to guide the development of multi-investigator proposals. The RCS’ overriding goal is to improve the quality and increase the number of extramural funding submissions. Its mission is to help investigators at all career stages and in all disciplines pursue extramural funding for research.

RESEARCH SUPPORT

Animal Use & Veterinary Care
The Department of Comparative Medicine prepared text that may be used in grant proposals to describe the resources and veterinary care provided at Penn State Hershey. The information is provided on the Infonet and is accessible to users with an ePass account. You must sign onto the Infonet to access the boilerplate language… click here.

Biorepository
Established in 2004, the Penn State Hershey Biorepository offers investigators a resource to enhance research into cancer and other disease processes. Tissue, associated blood, urine, buccal cell swabs and epidemiological data are available to conduct clinical and translational research studies that include genetic studies. All Penn State University researchers can request tissue from the Biorepository with an approved Institutional Review Board (IRB) protocol. Informed consent from donors is obtained through the Penn State Hershey Biorepository, thereby freeing investigators from that process. The Biorepository collects a wide variety of tumor tissue as well as adjacent normal tissue from surgical resections done at Penn State Hershey. Additionally, select normal control tissue is available. The Biorepository is a member in good standing with the International Society for Biological and Environmental Repositories (ISBER).

Electronic Medical Records (EMR)
The Hershey Medical Center utilizes the Cerner Corporation’s Millennium electronic medical record system. This system is CCHITsm certified and meets the inpatient electronic health record (EHR) criteria. PowerChart, the viewing window for Millennium, allows physicians to access full inpatient and outpatient data, complete orders, and check test results all within one computer program. Electronic medical records help to improve efficiency, safety, and coordination of medical care while reducing costs and errors. Staff enters all orders electronically except for chemotherapy. In addition, through the Penn State CTSI, the medical center has recently added a computer interface with the EMR called i2b2, which allows data mining of the EMR for clinical and translational research studies. Penn State Hershey Medical Center physicians at the University Park Campus and those who practice in the Joint Venture Penn State Hershey/Mount Nittany Cancer Center have access to Mount Nittany’s EMR, which is provided by MediTech.

Investigational Drug Service (IDS)
The Investigational Drug Service (IDS) at Penn State Milton S. Hershey Medical Center is charged with the control and management of investigational (research) drugs used in clinical (human) research trials throughout the institution. The IDS currently controls the procurement, storage, blinding, and dispensing of study medications in over 235 studies. The IDS also supports the AsthmaNet Clinical Research Network and the PSU Tobacco Center of Regulatory Science (TCORS). Current practice areas for study involvement include, but are not limited to, pediatric and adult oncology, cardiology, asthma and allergy, neurology, rheumatology,
dermatology, and biologics. The IDS also provides pharmacy services for multiple national cooperative investigating groups including the Children’s Oncology Group (COG), Eastern Cooperative Oncology Group-American College of Radiology Imaging Network (ECOG-ACRIN), Radiation Therapy Oncology Group (RTOG), National Cancer Institute (NCI), and National Institutes of Health (NIH). The Institutional Review Board (IRB) of the Penn State Milton S. Hershey Medical Center reviews and approves protocols for use in the facility. Pharmacists serve on the IRB, and the IDS only handle protocols that have undergone IRB review and approval. The IDS can assist investigators with the development of drug blinding/dispensing plans for investigator-initiated trials within the institution.

The IDS pharmacy is a 1,082 square foot pharmacy. Access is limited to pharmacy personnel with badge swipe access. The drug storage room within the IDS pharmacy is locked with a key. Only investigational medications are stored in the IDS pharmacy drug storage room. The IDS pharmacy maintains the following critical equipment: medication refrigerators (2-8°C), -20°C freezer, -80°C freezer, and controlled room temperature storage (20-25°C). Access to laminar airflow hoods and biosafety cabinets is provided by the inpatient pharmacy and the chemotherapy pharmacy. Critical equipment is plugged into red outlets that are connected to the back-up generator.

Temperature monitoring of study medications is accomplished using a system called AmegaView for continuous, wireless, electronic temperature monitoring. Each area (refrigerator, freezer, or room temperature space) where investigational medications are stored has its own temperature probe. Temperature readings are monitored continuously, and as long as no excursions occur, a recording is made every hour. Monthly, IDS pharmacy prints a graph of the temperature readings from each temperature probe. If an excursion occurs, a detailed list report of the time of the incident is printed for review. Temperature probes are calibrated yearly. Refrigerator set-points are 2°-8°C, with pre-alarms at 3° and 7° C. Room temperature set-points are 20°-25° C, with pre-alarms at 21° and 24° C. When temperatures reach a pre-alarm level, the system begins contacting pharmacy personnel via phone and pager, 24 hours a day, 7 days a week. If the area reaches an alarm level, temperatures are recorded every 5 minutes or until the area is back within the acceptable range, whichever occurs first. The system continually calls and pages until someone acts on the alarm.

The IDS pharmacy hours of operation are Monday – Friday, 7:00am – 5:30pm. Current staffing is provided by 3 Pharmacist FTE’s, 2 Certified Pharmacy Technician FTE’s, and 1 PRN pharmacist. Two additional certified pharmacy FTE’s support the TCORS projects.

**Laboratories**
The Penn State Milton S. Hershey Medical Center currently has 1,158 laboratories in 8 basic science departments and 16 clinical departments that total 371,205 square feet of assignable laboratory and research space. At the University Park campus there are 1,303,240 square feet of assignable laboratory and research space.

**REDCap (Research Electronic Data Capture)**
REDCap is a secure, web-based application that supports data capture and management for research studies. It is made available to the Penn State Community through the Clinical and Translational Sciences Institute (Penn State CTSI). REDCap is maintained by a consortium of over 700 domestic and foreign partners that actively serve to contribute, prioritize, test, and support the application. Penn State is a member of the REDCap Consortium. The Penn State CTSI website provides drop-in text for investigators to include in Institutional Review Board.
(IRB) submissions. In addition, the REDCap Consortium maintains a website that provides a detailed discussion of the software and technical overview – both of which can be utilized as drop-in text for funding proposals.

Section of Research Resources
The Section of Research Resources at the College of Medicine consists of seven institutional core facilities. A diverse Faculty Advisory Committee helps staff members develop policy and provide strategic direction. Core Facilities are accessible to all investigators at the College of Medicine and other PSU campuses at subsidized fee levels, as well as to researchers outside the University system at fee levels equal to full costs of analyses. Dr. Bruce Stanley heads The Section of Research Resources.

CORE FACILITIES - Penn State Hershey
The Penn State College of Medicine has institutional core research facilities to provide investigators shared access to specialized instrumentation and analytical services for the conduct of basic, clinical, and translational research. The Section of Research Resources at the College of Medicine consists of seven institutional core facilities. Each core is directed by a full-time faculty or staff member while core staff oversee daily operations and consult with investigators on experiment design. Strategic planning and fiscal management for all major core research facilities is provided by Vice Dean for Research and Graduate Studies. Core research facilities are available on a first-come, first-served basis to Penn State faculty and external users. User fees are recalculated each year to cover maintenance, consumables, and salary costs.

Macromolecular Core Facility
The purpose of the Macromolecular Core Facility is to provide state-of-the-art methods for analysis and synthesis of protein and nucleic acid structures. Current services include: Protein/peptide sequencing (Mass Spec), Peptide synthesis, Oligonucleotide synthesis, and Film Image analysis. For the most up-to-date information, see the facility’s web page and links at http://med.psu.edu/web/core/macromolecular-synthesis

Microscopy Imaging Facilities
The Microscopy Imaging Facility (MIF) provides services in ultra-high resolution imaging of cells and tissues in fixed or live states. The MIF also provides expert services in quantitative image analysis and consultations on microscopy-related research projects. The MIF houses: (1) a high end inverted confocal microscope system [Leica SP8 AOBS White Light Laser] and a sophisticated inverted wide field microscope with optical sectioning and deconvolution capabilities [DeltaVision Elite] which are capable of high resolution 3D or 4D fluorescence imaging of histological tissue sections (5-100 microns thick sections) or live/ fixed cells; (2) a transmission electron microscope [JEOL 1400 TEM] capable of ultra-structural biological imaging; (3) a cryo-transmission electron microscope [JEOL2100 Cryo-TEM] capable of single particle and single macromolecular complex imaging; (4) image processing workstations [Bitplane Imaris and Huygens] for complex 3D or 4D fluorescence image processing and quantitative image analysis; (5) image processing workstations [auto3dem and EMAN2] for cryo-TEM image processing and 3D reconstruction. For the most up-to-date information including recent publications, see the facility’s web page and links at


Flow Cytometry Core Facility
Both clinical samples and research samples are routinely analyzed in this clinically (CAP)–accredited facility. The Flow Cytometry Core Facility routinely analyzes both Clinical samples and Research samples in this clinically (CAP)–accredited facility. Two 2-laser, 4-color Becton Dickinson FACSCaliburs, one 3-laser, 6-color Becton Dickinson FACSCantoll, one 2-laser, 6-color Becton Dickinson FACSCanto, one 4-laser, 15-color Becton Dickinson LSR II and one 4-laser, 16-color Becton-Dickinson LSR Fortessa are available for use by investigators. In addition, a 4-laser, 16-color Becton Dickinson Aria III high-speed 4-way sorter housed within a biocontainment hood is available for operator-assisted live cell sorting. Computer workstations equipped with multiple flow cytometry analysis software are available for data analysis. For the most up-to-date information, see the facility’s web page and links at http://med.psu.edu/web/core/flow-cytometry

Genome Sciences Core Facility
The Penn State Hershey Genome Sciences Facility is a full service facility and provides consultation, instrumentation, and services to both Penn State and non-Penn State investigators in genomic, epigenomic, and transcriptomic studies. The variety of instrumentation allows for capabilities ranging from highly focused analysis of candidate SNPs, and mRNAs to whole genome, exome, epigenome, and transcriptome sequencing. Services are also available for a variety of study designs extending from a few laboratory samples to large (100s to 1,000s of samples) clinical projects. Full bioinformatics service is also available for data analysis. The Facility resides in 5,000 square feet of newly renovated space, encompassing separate “pre-amplification” and “post-amplification” rooms to prevent any contamination of PCR-amplified materials to pre-processed input DNA/RNA samples. Four well-experienced staffs are available for assisting project operation. In addition, the lab space is available for investigators who need temporary room for sample preparation. The facility receives either tissue, DNA/RNA, or customer-generated NGS libraries. It processes samples according to prior consultation and agreement with the PI on experiment design. The facility develops new applications to accommodate state-of-the-art NGS technologies. It also conducts sequencing reads alignment, secondary analysis (quantitation, variant calling, functional annotation, visualization, etc) and follow-up interpretation of results. The facility provides grant writing support and educates/trains students/post-docs with hands-on NGS processing. For the most up-to-date information, see the facility’s web page and links at http://med.psu.edu/web/core/gene-expression-analysis.

Mass Spec & Proteomics Facility
This facility provides multiple separation, digestion, chemical derivatization, mass spec, and database searching services for proteomic, carbohydrate, oligonucleotide, lipidomics, and small molecule analysis. Analyses available including targeted methods for quantitation of pre-determined metabolites or proteins, data-dependent discovery methods to ID and quantitate hundreds to thousands of metabolites or proteins, and SWATH/Data-Independent Analyses (DIA) for simultaneous identification and quantitation. Instrumentation includes an ABSciex TripleTOF 5600, an ABSciex MALDI TOF-TOF 5800; an MDS/Sciex 4000 QTrap (Hybrid Ion Trap); a Waters Synapt HDMS; and a Voyager DE-PRO MALDI-TOF; an ABI Tempo LC-MALDI Plate Spotter; Shimadzu, Eksigent, Agilent 1100, Waters Acquity and NanoAcquity HPLC and UPLC systems; and a Beckman- Coulter PF-2D system for whole
protein level separations and quantitation. For the most up-to-date information, see the facility’s web page and links at http://med.psu.edu/web/core/proteins-mass-spectometry.

MRI/MRS Facility
The MRI/MRS Core Facility is located in the Center for NMR Research (CNMRR), which occupies approximately 6,500 square feet in the MRI building facing the Biomedical Research Wing of the College of Medicine. The core provides both in vivo and ex vivo Magnetic Resonance Imaging (MRI) and Magnetic Resonance Spectroscopy (MRS) services in animals and humans. These are particularly attractive techniques because they allow the viewing or measurement of closed internal structures or metabolism of living animals or cells in a completely noninvasive and nondestructive manner. Magnetic Resonance offers a wide variety of fundamental measurements of anatomy and physiology. These include detailed anatomical imaging in soft tissues, quantitative measurements of blood flow or perfusion, brain white matter fiber tracking, measurement of metabolism and kinetics in internal organs in situ, volume and staging of tumors, and functional MRI (fMRI) which can view the effects of specific stimuli on specific brain neurons or regions, allowing one a means to “see” the brain think. For the most up-to-date information, see the facility’s web page and links at http://www.pennstatehershey.org/web/mricore/home/overview

Solution Phase NMR Facility
The NMR Facility has a 500 MHz and a 600 MHz Bruker spectrometers with cryoprobes for macromolecular structure determination, small molecule structure elucidation and metabolomics studies.

Zebrafish Genomics Core Facility
The Zebrafish Functional Genomics and Imaging Core at the Penn State College of Medicine was established to provide the Penn State research community with a modern, centralized facility for housing, breeding and performing experiments with zebrafish, one of the fastest growing model systems in biomedical research. The core includes a central housing room equipped with 32 racks of recirculating aquaria, an isolated quarantine room, a procedure room with microinjection stations, and two photo booths to provide bright field and fluorescent imaging. Traditionally employed as a model of developmental biology, due to its optical clarity and regenerative capabilities, the zebrafish (Danio rerio) has become one of the preeminent models of human genetic disease, thanks in part to the availability of a high-quality, annotated genetic sequence. Approximately 70% of human protein-coding genes and 84% of human disease-associated genes have functional genetic homologs in zebrafish. For the most up-to-date information including recent publications, see the facility’s web page and links at http://www.pennstatehershey.org/web/core/zebrafish-functional-genomics-core

INSTITUTES AND CENTERS

(Penn State Hershey)

Center for NMR Research (CNMRR)
The Center for NMR Research was founded in 1988 by the Department of Radiology with continuing extramural funding including a Bioengineering Research Partnership grant through the NIH/NIBIB. The Center for NMR Research (CNMRR) is a state-of-the-art research facility of
the Department of Radiology at the College of Medicine. The research activities in the CNMRR focus on two fronts: 1) Methodology development of magnetic resonance imaging/spectroscopy, functional MRI and their clinical applications in human and animal models. 2) Radiofrequency magnetic field engineering. There are 4 full time research faculty members in the CNMRR collaborating with and supporting research activities within the College of Medicine.

Center for Pediatric Cardiovascular Research
The Center for Pediatric Cardiovascular Research dates back to 2003, when the Department of Pediatrics brought together a new multi-disciplinary team focused on reducing the adverse effects of cardiovascular operations at the Pediatric Cardiac Research Laboratories. The center combines basic science, engineering, and clinical applications under the unified mission of pediatric cardiovascular research. Its main objective is the development of novel technologies and methodologies aimed at minimizing the adverse effects of cardiovascular operations, mechanical circulatory support systems, and cardiopulmonary bypass procedures in neonates, infants, and children. Particular attention is focused on reducing the associated morbidities of cerebral, myocardial, pulmonary, and renal injury. The Center was formally recognized in 2009 and has more than 20 faculty members from Departments of Pediatrics, Surgery, Bioengineering, Public Health Sciences, Pharmacology, Comparative Medicine, Obstetrics & Gynecology, Microbiology & Immunology, and Anesthesiology, as well as several national and international faculty members from China, France, Germany, Korea, Italy, and Turkey. Within the first 9 years, the Center’s pediatric cardiac research group generated more than 360 publications, more than 250 national and international presentations and invited lectures, as well as more than $7 million in grants. The Center has trained dozens of medical students, post-doctoral fellows, and undergraduate and graduate biomedical engineering students.

Clinical Research Center
A key physical resource of the Penn State CTSI is the Clinical Research Center (CRC) – the institute’s home for clinical research. On a fee for service basis (with discounted rates for NIH funded studies and trainees), the CRC provides expert nursing care, equipment and state of the art facilities that include approximately 6,800 square feet of space, five patient exam rooms, an interview/consult room, a DXA room, two procedure rooms, three infusion sleep rooms and an exercise room. Since 1995, over 950 different protocols and 190 investigators have used the CRC facilities. The CRC hosts investigators funded by NIH and other federal, state and local agencies as well as by the private sector.

Penn State Center for Women's Health Research
The mission of the Penn State Center for Women’s Health Research is to promote research on women’s health and on sex/gender differences related to health by supporting a network of faculty members in multiple disciplines who are interested in research collaborations to study various aspects of women’s health. The Center maintains information about active projects, data sets, and funding opportunities; promotes the development of interdisciplinary research teams around specific topics; provides mentoring opportunities for junior faculty members; and facilitates preparation of grant applications. The goal is to advance the science and contribute to the development of health promotion, disease prevention, health services delivery, and health policy approaches to improving women’s health and wellbeing across the life span. The Center was founded in 2004 as the Central Pennsylvania Center of Excellence for Research on Pregnancy Outcomes, with a grant from the Pennsylvania Department of Health (nonformula tobacco settlement funds). The Center was re-named the Penn State Center for Women’s Health Research in 2011 to reflect the expanded research and training agenda in women’s
health. The Center coordinates with the Penn State BIRCHW Program, a K12 training program funded by NIH that provides mentored research career development for junior faculty members interested in women’s health or sex/gender differences related to health. Administratively based in the Department of Public Health Sciences in the College of Medicine, the Center welcomes participation by Penn State faculty members and students interested in research on women’s health and sex/gender issues related to health. The Center offers opportunities for research collaboration, mentoring, datasets and measures, and other resources for developing and conducting women’s health research projects.

The Penn State Center for Women’s Health Research has developed boilerplate language that describes institutional resources in women’s health. This language could be used in any grant application on a women’s health topic. Visit the website for more information: http://www.womenshealthcoe.psu.edu/grant_info.html

Penn State Clinical and Translational Sciences Institute (CTSI)
The Penn State Clinical and Translational Sciences Institute (Penn State CTSI) was established in June 2011 with a $27.3 million award from the National Institutes of Health (NIH). The Institute leverages resources from 5 colleges and 17 departments across two campuses - Penn State Hershey and University Park. The Penn State CTSI is a member of a prestigious consortium of institutions, including Harvard, Johns Hopkins, and the Mayo Clinic, that are using the NIH funding to increase their infrastructure to support translational research. The institution’s commitment to the CTSI includes a 14,000 square foot Clinical Research Center (CRC) at the University Park campus, a 6,800 square foot CRC at Penn State Hershey Medical Center and a 1,900 square foot office on the Hershey campus that functions as the administrative core. The CRCs are a key physical resource of the Penn State CTSI. On a fee for service basis (with discounted rates for NIH-funded studies and trainees), the CRCs provide expert nursing care, equipment and state of the art facilities that include patient exam rooms, interview/consult rooms, and procedure rooms. The CRCs host investigators funded by NIH and other federal, state and local agencies as well investigators funded by the private sector.

The Penn State CTSI helps to foster the career development of junior faculty committed to careers in translational research. The Penn State CTSI achieves this objective through dedicated programs, such as the KL2 grant that is made available to junior faculty on both the Hershey and University Park campuses to undertake additional mentored research and training. A key function area within the Penn State CTSI is Research Education, Training, and Career Development, which seeks to encourage cross-campus research groups and to broaden the base of trainees that participate in CTSI-funded career development programs, such as the KL2.

Penn State Hershey Clinical Simulation Center
The Penn State Hershey Clinical Simulation Center (SIM Center) centralizes clinical training resources for students, residents, and other health care personnel. In January 2010, Penn State Hershey completed an expansion of the SIM Center that nearly doubled its size and located the facility at a more central campus location – the second floor of the George T. Harrell Health Sciences Library at the College of Medicine. A key feature of the 9,500 square-foot SIM Center are the 10 small encounter rooms that support one-on-one or small group training with standardized patients (SPs), manikins or task trainers. Each room is equipped with 2 cameras and audio plus an auxiliary input for capturing signals from patient equipment or manikin monitors. Room layout is similar to a patient exam room with computers inside and outside the room that can be used for pretests, post encounter questionnaires or SP scoring. These rooms
are ideal for the Standardized Patient Program, which uses actors and patient volunteers to help medical students develop and practice skills like history taking, physical examination, and patient communication, without risk to patients. The SIM Center also includes 3 larger bays that can accommodate a variety of layouts, such as an ICU or operating room with real equipment and monitoring or an ED trauma bay. Each bay can be used separately, or the partitions between the bays can be raised to create spaces large enough to house several manikins for triage scenarios or care team training. The bays can each be recorded and the largest bay is equipped with a large 54” LCD display. Skills are practiced in one of two spaces: the virtual reality room is equipped with virtual reality trainers, phantoms and box trainers; the skills task training room has individual task trainers and non-anatomic models. There are several cameras set up in the skills room to record trainees performing procedures for competencies. The models can also be moved into the bays to create blended training sessions with manikins or SPs, or into the rooms to create multiple learning stations that students can rotate through. Conference space and debriefing rooms are used for pretests, lectures in preparation for a hands-on session, debriefing videos of sessions, or post session questionnaires. Some of the rooms have smart boards and teleconference capabilities. All rooms can also be recorded for archiving lectures or for instructor quality improvement training. For large groups there is a lecture hall very close to the Center which holds approximately 150 students and a large classroom for approximately 80 students. Teleconferencing between the large classrooms and a debriefing space is possible. A computer lab is next to the Center, which has presentation equipment and computer stations for approximately 25 students. In addition, there are two small rooms adjacent to the Center that have audiovisual equipment installed to increase the small encounter rooms to 12 when needed.

The Center’s expansion and relocation at the heart of Hershey campus is the natural outgrowth of the Medical Center and College of Medicine’s nearly two decades of leadership in the field of simulation education and underscores the organization’s commitment to innovative teaching methods that ultimately improve patient care and outcomes. To advance the field of healthcare simulation, the SIM Center conducts innovative research into simulation theory, practice, and technology.

**Penn State Hershey Eye Center**
The Penn State Hershey Eye Center consists of 19 full-time faculty members representing most ophthalmic specialty areas, including Ophthalmology, Physiology, Cellular and Molecular Biology and Neuroscience. The Center’s interdisciplinary team of scientists seeks to characterize the cellular and molecular mechanisms that lead to vision impairment in diabetes and to generate novel treatments to cure diabetic retinopathy. The Center’s clinical studies are conducted through the Clinical Research Unit, which provides high-quality, personalized and confidential care for patients who participate in clinical research. The Retina Research Laboratories represents a collective group of research facilities and scientists studying degeneration of vascular and neural cells in diabetic retinopathy. The Eye Center has an active medical student education program.

**Penn State Hershey Inflammatory Bowel Disease Center (IBD Center)**
The Penn State Hershey Inflammatory Bowel Disease Center (IBD Center) was established in 1998 to investigate the causes of IBD as a means toward identifying novel therapeutic targets and improving patient care. This nationally-recognized facility is dedicated solely to the diagnosis, treatment and eventual cure of patients suffering with inflammatory bowel diseases including Crohn’s disease and ulcerative colitis. The IBC Center is comprised of medical experts from multiple specialties, all highly-trained and well experienced in the treatment of Crohn’s
in disease and ulcerative colitis. In 1998, the IBD Center established the area’s first IBD-dedicated BioBank, which consisted of an IBD patient registry that characterizes the clinical factors used to define subcategories of IBD. Today, the BioBank includes 2 additional components: a DNA bank derived from the blood samples of IBD registry participants and an IBD tissue library (established in 2006) from samples harvested at the time of surgery. The BioBank fosters strong academic and clinical collaboration. The Center’s basic research programs seek to identify and characterize the genes and epigenetic changes involved in causing IBD and related conditions. The Center also offers patients the opportunity to participate in clinical studies of new, investigational drug therapies for ulcerative colitis and Crohn’s disease. The IBD Center currently treats more than 5,000 IBD patients.

Penn State Hershey Melanoma Center
In an effort to fight this trend, Penn State Hershey Melanoma Center offers a multidisciplinary approach to developing new treatments for melanoma patients. The Melanoma Center convenes researchers and clinicians from surgery, dermatology, medical and radiation oncology, pharmacology, orthopedics and other areas with a goal of identifying and evaluating new agents and clinical interventions. Discoveries developed in the research portion of the Melanoma Center are tested through a portfolio of clinical trials offered to patients. The Consortium of Pennsylvania Melanoma Centers was established on February 26, 2013 and includes melanoma centers/programs from Penn State; University of Pennsylvania; Thomas Jefferson; The Wistar Institute, St Luke’s Hospital, Temple University/Fox Chase and the University of Pittsburgh. The consortium is the first of its kind in the melanoma arena and will significantly advance efforts to prevent and treat melanoma. The Consortium serves as a resource for researchers, clinicians and melanoma patients. It provides its members with opportunities to collaborate, calling upon complementary expertise and resources to address many of the obstacles associated with this disease. Clinicians from the consortium have access to melanoma patients from all sites for accrual to personalized therapeutic trails. Patients can also easily access up to date information regarding the latest clinical trials at each institution. The Consortium also addresses legislative issues related to the disease and interacts with grassroots organizations/foundations.

Penn State Heart and Vascular Institute (PSHVI)
The HVI participates in both clinical trials and investigator-initiated physiology research experiments that seek to understand neurovascular mechanisms of circulatory control and to determine cause-and-effect pathways relating to heart disease and how exercise impacts the cardiovascular system. The HVI pioneered the total artificial heart in the late 70’s and early 80’s, and continues to be at the cutting edge of cardiovascular device development and implementation. When the Penn State College of Medicine launched the Penn State Heart and Vascular Institute (PSHVI) in 2005, it brought together specialists and researchers previously housed in the clinical departments of medicine, surgery, and radiology. The PSHVI is a national model for comprehensive cardiovascular care that includes a team of more than 40 specialists who treat patients with the most severe heart and vascular conditions. PSHVI faculty participate in both clinical trials and investigator-initiated physiology research experiments that seek to understand neurovascular mechanisms of circulatory control and to determine cause-and-effect pathways relating to heart disease and how exercise impacts the cardiovascular system. The PSHVI pioneered the total artificial heart in the late 70’s and early 80’s, and continues to be at the cutting edge of cardiovascular device development and implementation. PSHVI researchers use the Penn State CTSI’s Clinical Research Center (CRC) to conduct all human studies. Within the last 5 years, the PSHVI has continued to expand its presence in State College, not only in
terms of preventative care and surgical intervention, but also with clinical trials undertaken in collaboration with the Hershey campus.

Penn State Bone and Joint Institute
The Penn State Bone and Joint Institute is a leader in the care of patients with disorders of the bones, joints, and spine, providing innovative care to adults and children with common to the most complex disorders. The institute embraces a multidisciplinary, collaborative approach with specialists in orthopedics, sports medicine, spinal disorders, hand surgery, metabolic bone disease and osteoporosis, rheumatology, radiology, chronic pain management, and therapy services.

Penn State Hershey Cancer Institute
Founded in 1996, the Penn State Hershey Cancer Institute has evolved to be a unique partnership between the Penn State Hershey Medical Center, The Pennsylvania State University, Lehigh Valley Hospital and Health Network, and Mount Nittany Medical Center. Along with its affiliate members Lewistown Hospital, St. Joseph Medical Center, and Susquehanna Health System, the Penn State Hershey Cancer Institute is dedicated to advancing cancer research through the discovery of new approaches to prevention and treatment, improving care delivery, enhancing survivorship and quality of life for people living with cancer, and educating health care professionals, patients, and caregivers in local communities. The Institute dedicated a new building in 2009 that includes extensive new laboratory facilities. The Institute now has 143 investigators from 25 academic departments in 6 colleges located at the Hershey and University Park campuses. Its clinical services include surgery, radiation, and chemotherapy and its scientific programs focus on cancer virology and immunology, mechanisms of carcinogenesis and chemoprevention, cancer control and population health, and experimental therapeutics. The institute dedicated a new building in 2009 that includes extensive new laboratory facilities. In 2013, Penn State joined other Big Ten schools to form the Big Ten Cancer Research Consortium, a partnership of leading universities and cancer centers across the United States that will pursue collaborative, hypothesis-driven, highly translational oncology research that leverages the scientific and clinical expertise of member universities. The Penn State Hershey Cancer Institute treats nearly 3,000 new cancer patients every year.

Penn State Hershey Institute for Personalized Medicine (IPM)
Launched in early 2012, the Institute for Personalized Medicine (IPM) brings together faculty, resources, and programs devoted to advancing personalized medicine. IPM uses a multifaceted approach to understand the correlation among a person’s biologic framework, the environment in which he or she lives, disease predisposition, and treatment options. By pursuing translational research—the kind of research that directly applies the latest scientific technologies to a patient’s clinical condition—physicians and scientists can tailor health care to individual patients and help improve medical outcomes. A major goal of IPM is to establish a large bank of genetic samples from patients and to use those samples for the conduct of research to develop more targeted treatments. IPM works in close collaboration with departments and institutes across the Hershey campus to translate research into clinical applications.
Penn State Hershey Neuroscience Institute
The Penn State Hershey Neuroscience Institute fosters collaboration among the neuroscience-related departments and divisions within Penn State Milton S. Hershey Medical Center and Penn State College of Medicine.

(University Park)
Several institutes based at the University Park campus provide a platform for cross-campus collaborative research:

Institute for the Arts & Humanities
Founded in 1966, Penn State’s Institute for the Arts and Humanities is one of the oldest and most distinctive interdisciplinary centers in the nation. Over the past fifty years, major American universities have created dozens of advanced research institutes in the humanities and/or centers for the fine and performing arts, but because the arts and humanities are almost always housed in different colleges with different administrative structures, most universities have kept their arts and humanities centers separate. Penn State, by contrast, is one of a handful of universities whose interdisciplinary institute was designed from the outset to bring together innovative work in the arts and humanities—under one roof, across two colleges.

Institute for Cyberscience
The Institute for CyberScience (ICS) was created in 2007 with the specific objective of coupling computing and information sciences with the core disciplines and exploring how cyberscience could enable connections between disciplines and promote large-scale collaborations. The catalyst for developing the ICS was a major research instrumentation grant from the National Science Foundation (NSF), which positioned Penn State to purchase CyberSTAR, a shared system that has computing rates of 20 teraops (10^{12} \text{ operations/sec}) and a half petabyte (10^{15}) of storage. CyberSTAR provides new capabilities, including hosting of the data-intensive Galaxy bioinformatics gateway and an observatory science gateway with real time sense-simulate-predict functions. CyberSTAR is used by 120+ researchers across all institutes and colleges and in undergraduate and graduate courses throughout Penn State.

Institutes of Energy & the Environment
The Penn State Institutes of Energy and the Environment (PSIEE) is the central coordinating structure for energy and environmental research, education, and outreach at Penn State. It is a dynamic, tightly coupled, intercampus network of expertise and infrastructure organized under the Office of the Vice President for Research. The mission of the PSIEE, according to its 2012-2019 strategic plan is “…to foster and facilitate interdisciplinary scholarship and collaboration to positively impact important energy and environmental challenges.” The PSIEE is organized around five working research themes: (1) Smart energy systems, (2) future energy supply, (3) health and environment, (4) climate and ecosystem change, and (5) water and biogeochemical cycles. (For a detailed discussion of the PSIEE’s 5 working research themes and strategic goals, review its 2014-2019 Strategic Plan, which is available on PSIEE’s website.)

Materials Research Institute (MRI)
The Materials Research Institute (MRI) was established in 1995 to promote, develop, and integrate materials science across the Pennsylvania State University. A university-wide resource, the MRI is focused on facilitating interdisciplinary interaction and collaboration among faculty and researchers within and beyond Penn State through administration of core facilities.
for materials characterization and nanofabrication and pursuit of strategic research themes based on faculty expertise, grant challenges and funding opportunities, and partnerships with industry. The MRI boasts extensive capabilities across broad areas of materials science that include: 1) electronic materials, devices and systems; 2) materials characterization and processing; 3) optics, photonics and imaging; 4) nanoscience, nanomaterials, nanostructures and nanofabrication; and 5) biomedical materials and devices. All of the STEM disciplines are represented in the MRI’s diverse and distinguished faculty. As a centrally administered major research institute, the MRI effectively supports the research of faculty across several departments and colleges while pursuing joint initiatives with other major Penn State institutes, including, the Huck Institutes of the Life Sciences (co-located with the MRI in the Millennium Science Complex), the Penn State Institutes of Energy and the Environment and the Institute for Cyberscience. The MRI is located in the Millennium Science Complex, a 297,000 square foot research building located in the heart of the science corridor at the University Park campus. The LEED Gold certified building features 16,000 square feet of materials characterization space, 16,000 square feet of cleanroom, and 2,800 square feet of collaboration spaces. The building is shared with the Huck Institutes of the Life Sciences.

**Rock Ethics Institute**

The Rock Ethics Institute was established in 2001 and is focused on developing tools to identify and deal with ethical challenges. The Institute sponsors a bioethics lecture series that addresses research ethics, including the impact of industry and government funding on biomedical research. The multiple intersecting, yet often incongruent interests of scientists, individuals, communities, and industry engaged in biomedical research create complex conflicts of interest that can cause physical, emotional and economical harm to individuals and society. Open-minded, prospective and sensible consideration of ethical concerns is critical to take full advantage of new discoveries and knowledge.

**Social Science Research Institute (SSRI)**

The mission of the Social Science Research Institute (SSRI) is to foster novel, interdisciplinary research that addresses critical human and social problems at the local, national, and international levels. In addition to its strong collaborative ties with the CTSI, SSRI is made up of 9 core units: 1) the Population Research Institute (PRI), which aims to advance the scientific understanding of human population dynamics and is one of only 24 NIH funded population research centers in the nation; 2) the Children, Youth and Families Consortium (CYFC), which promotes research on behavior, health, and development in diverse populations of children and families; 3) the Research Data Center (RDC), which provides researchers with a secure connection to data collected by the U.S. Census Bureau and the National Center for Health Statistics; 4) the Social, Life and Engineering Sciences Imaging Center (SLEIC), which provides equipment and support for human and animal MRI and EEG studies for researchers across the university; 5) The Survey Research Center (SRC), which provides high quality, cost effective survey research services to faculty around the University; 6) the Network on Child Protection and Well-Being, which is an interdisciplinary group of faculty dedicated to identifying the causes of child maltreatment and developing evidence-based approaches that will promote prevention, detection, and treatment; 7) the Quantitative Development Systems Methodology core (QuantDev), which provides consultation on measurement, study design, and analysis techniques for social scientists; 8) the Geographic Information Analysis Core (GIA), which provides services to facilitate the use of geospatial data and a spatial perspective in social science research; and 9) the Clearinghouse for Military Family Readiness, which provides expertise in the science of program implementation and evaluation and is a comprehensive
resource for professionals working with military families.

The Huck Institutes of the Life Sciences

General Description:

The Huck Institutes ("The Huck") encompass a highly successful group of interdisciplinary institutes at Penn State. Since inception, The Huck came to be regarded as a national model to share talent, resources and expertise, and to foster truly interdisciplinary collaborations. The Huck Institutes supports several intercollege graduate training experiences designed to provide future scientists from a variety of disciplines interdisciplinary and curricula and mentoring. The Huck encompasses a group of scientists from the Eberly College of Science, the College of Medicine, and the College of Information Sciences and Technology that use innovative tools to study and approach infectious diseases “from protein to pandemic.” The history of The Huck exemplifies Penn State’s visionary commitment to interdisciplinary team science. The Huck is dedicated to strengthening research in the life sciences, preparing students for successful careers, and encouraging new perspectives across disciplinary boundaries. The institute co-funds many faculty members and graduate students, and provides administrative and technical support for research and teaching. With completion of the Millennium Science Complex in 2011, the Pennsylvania State University gained an exciting interdisciplinary space inhabited by some of the best researchers in life and materials sciences. The 275,600 square foot facility, which was designed to LEED Gold standards, is shared between The Huck and the Materials Research Institute (MRI). At the Millennium Science Complex, researchers and students work side-by-side in a space designed to put everyone in constant contact with one another.

Detailed Description:

The Huck is recognized as a national model to share talent, resources and expertise, and to foster truly interdisciplinary collaborations. The Huck supports several intercollege graduate training experiences designed to provide future scientists from a variety of disciplines interdisciplinary and curricula and mentoring. The Huck co-funds many faculty and graduate students, and provides administrative and technical support for research and teaching. The Huck and the Materials Research Institute (MRI) are housed in the Millennium Science Complex, an exciting interdisciplinary space inhabited by some of the best researchers in life and materials sciences. The 275,600 square foot facility, which was designed to LEED Gold standards and provides an infrastructure the supports interdisciplinary endeavors. The Huck coordinates many of the shared resources at other centers and institutes and supports the education and research missions of the University by serving as the umbrella for University-wide centers and institutes that support the life sciences. The history of The Huck exemplifies Penn State’s visionary commitment to interdisciplinary team science. Founded in 1996 as the Life Sciences Consortium to encourage greater coordination and interdisciplinary collaboration in the life sciences, the Consortium was renamed in 2002 in recognition of the generosity of support from Dorothy Foehr Huck and J. Lloyd Huck. The Huck Institutes are one of several interdisciplinary research units supported by the Office of the Senior Vice President for Research at Penn State.

The Huck encompasses a highly successful group of interdisciplinary institutes comprised of faculty from colleges and departments across the University system. The 4 institutes that comprise The Huck are supported by numerous Centers of Excellence, which concentrate on building the institution’s competitive strength within a defined area of research and education.
The Huck and corresponding Centers of Excellence are as follows:

**Genome Sciences Institute** – The Genome Sciences Institute seeks to understand the function and evolution of genomes, how they interact with each other and the environment and the consequences for health and fitness. This mission requires a combination of new high throughput experimental techniques and innovative approaches to handling, analyzing and integrating the massive amounts of data produced by these techniques. This institute brings together researchers from across Penn State in the areas of bioinformatics, computational genomics, evolutionary genomics, functional genomics, and proteomics. The primary aim is to catalyze collaborations between researchers in the fields of genomics, proteomics, and bioinformatics. Projects within the Institute belong to four broad thematic areas: (1) algorithms, (2) computational tools and bioinformatics, (3) statistics and machine learning for high throughput data analysis and integration, and (4) functional, evolutionary and ecological genomics, translation and biomedical applications. The Institutes is comprised of the following Centers of Excellence: Center for Comparative Genomics and Bioinformatics; Center for Computational Proteomics; Center for Eukaryotic Gene Regulation; Center for Medical Genomics; Center for RNA Molecular Biology; Center for Statistical Genetics; Center for Systems Genomics; Center for Cellular Dynamics.

**Infectious Disease Institute** – The Infectious Disease Institutes brings together theoreticians and empirical scientists in a wide variety of disciplines to collaborate and innovate in the area of infectious disease research. Comprising the Center for Infectious Disease Dynamics (CIDD) and the Center for Molecular Immunology and Infectious Disease, the Infectious Disease Institute and its faculty are at the leading edge of infectious disease research at Penn State. The Institute and its faculty also support the Huck Institutes' Immunology and Infectious Diseases emphasis area in the Molecular, Cellular & Integrative Biosciences Program (MCiBS) graduate program.

**Institute of the Neurosciences** - Facilitating collaboration and networking between scientists and students in the areas of neuroscience at the Penn State Hershey College of Medicine and the University Park campus. The Institute also provides oversight and coordination for neuroscience-related activities in education, research, patient care and outreach, while promoting an intellectual environment that enhances the interdisciplinary neuroscience educational experience from the undergraduate to postdoctoral levels. The Institutes is comprised of the following Centers of Excellence: Center for Aging and Neurodegenerative Disease; Center for Brain, Behavior, and Cognition; Center for Language Science; Center for Molecular Investigation of Neurological Disorders; Center for Motor Control; Center for Neural Engineering; Hershey Spine Center; Hershey Stroke Center.

**Ecology Institute** - Building and promoting ecological science and its application through interdisciplinary research. The Institutes is comprised of the following Centers of Excellence: Center for Infectious Disease Dynamics (CIDD); Center for Pollinator Research; Center for Chemical Ecology; Riparia; Center for Landscape Dynamics; The Polar Center; The Agriculture and Environment Center; Center for Climate Risk Management.