

Student Research Opportunities

2018 – 19

 Washington
University in St. Louis

SCHOOL OF MEDICINE

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Foreword

Washington University School of Medicine is an internationally recognized institution where an outstanding faculty directs compassionate patient care and world-class research. Consistently ranked as one of the best medical schools in the country, Washington University offers stimulating and challenging educational opportunities.

Although many students come to Washington University for the superb clinical training the school offers, approximately 95 percent of each year's graduates of the School of Medicine are involved in research. During the Washington University fiscal year ending June 30, 2017, the School of Medicine received \$411.4 million from the National Institutes of Health (NIH).

The vast size and broad scope of the research activities at Washington University provide many opportunities for any medical student who has an interest in pursuing research into any aspect of modern medicine.

This brochure provides a brief description of the following research opportunities: Summer Research Opportunities, One-Year Research Opportunities, the Medical Scientist Training Program (MSTP), and Fourth-Year Research Electives. Additional information covers financial considerations, length of programs, eligibility requirements, application instructions, and contact information.

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Summer Research Opportunities for Medical Students

Summer research opportunities for medical students involve participation in two to three months of full-time research in the following programs: National Heart, Lung, and Blood Institute (NHLBI)/Dean's Summer Research, Clinical Research Training Center (CRTC) Predoctoral Clinical Research Training Program TL1-Summer, Mallinckrodt Institute of Radiology, Alvin J. Siteman Cancer Center, and Summer Opportunities Abroad. Approximately 95 students participate in summer research each year.

National Heart, Lung, and Blood Institute (NHLBI)/Dean's Summer Research Program

Objectives: To provide medical students with hands-on research experience. This can be a first-time experience or a project related or unrelated to research conducted as an undergraduate. Excellent mentors from a broad range of basic and clinical sciences are available. A Washington University Summer Research Fellowship can provide a strong background for applications to the yearlong and MD/PhD (MSTP) degree programs, lead to abstracts at meetings and to publications, and enhance applications for competitive residencies.

Length of Program: Students work full-time on their research project for 2.5 months during the period from late May until classes start in August.

Funding: Fellowships provide a stipend. Support is provided through the NHLBI and Washington University School of Medicine Dean's Fellowships.

Eligibility: Applicants must be full-time medical students at Washington University School of Medicine and in good academic standing without encumbrances. All research is conducted under the direction of a full-time faculty member of the School of Medicine.

Research Interests: Students may consult a list of faculty research interests at dbbs.wustl.edu and medicine.wustl.edu/directory/academic-departments. Students should visit prospective mentors to discuss possible projects and background reading.

Requirements: To get started, students must meet with the Associate Dean for Medical Student Research to discuss their research interests. Students are required to write a one- to three-page research proposal by March 15, to write an abstract and present a poster at the annual Research Training Symposium and Poster Session in the fall, and to write a research report in August. Research must have appropriate human or animal committee approvals, and students are required to attend a Research Ethics Seminar and the Friday Summer Seminar Series. No academic credits may be earned from the Summer Research Program.

Stipend: Students receive \$1,987 per month.

Application: Deadline is March 15. Interested students may request an application or obtain additional information by contacting:

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Associate Dean for Medical Student Research
Director, Office of Medical Student Research
Instructor, Cell Biology and Physiology
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Voice: (314) 362-5464
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Roz Robinson
Project Manager/Research Administrator
Office of Medical Student Research
Voice: (314) 362-6857
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TL1 Summer Predoctoral Clinical Research Program

Overview: The TL1 Summer Predoctoral Clinical Research Program offered through the Clinical Research Training Center (CRTC) provides medical and allied health students with a two-month (June and July) mentored clinical or translational research experience, didactic coursework, and career development seminars. As a core educational component of the Institute of Clinical and Translational Sciences (ICTS) at Washington University, the CRTC Predoctoral Program strives to:

- Promote clinical and translational research training for medical and allied health care predoctoral students
- Create an efficient entry into a variety of clinical research careers
- Allow flexibility to develop novel and unique clinical and translational research projects

Objectives: The TL1 Summer Predoctoral Clinical Research Program is an introductory program that supports a select group of trainees and exposes them to excellent patient-oriented researchers. In addition, the program will instruct students to:

- Design and conduct clinical research
- Analyze data

- Consider relevant ethical and legal issues
- Give oral presentations
- Develop and present scientific posters

Eligibility and Requirements: Doctoral-degree students in medicine, physical therapy, occupational therapy, biomedical engineering, pharmacy, audiology and communications sciences, and other allied health professions who wish to learn more about academic careers in clinical and translational research are eligible. No prior clinical or translational research is required. Trainees accepted into the program must be able to commit full-time effort to the program for the two-month duration of the appointment (June and July), successfully complete all coursework, attend the Research Ethics Seminar and the Friday Summer Seminar Series, and participate in the annual Research Training Symposium and Poster Session in October following the trainees' appointment.

TL1 Summer Predoctoral Clinical Research Program Required Courses:

- Analysis of Clinical Data (M17-5881, Summer, 1 credit)
- Designing Outcomes and Clinical Research Workshop (M17-504, Summer, 1 credit)

Stipend: Students receive the equivalent to the current NIH predoctoral stipend level (\$1,987 per month).

Application: Applications for the TL1 Summer Predoctoral Clinical Research Program accepted online at crtc.wustl.edu. Applications open in late fall of each year and close in early spring of the following year. Prospective trainees are responsible for completing all required steps of the application, admission, and enrollment process.

More Information: For more information, including specific application and coursework requirements, please visit the program website at crtc.wustl.edu or contact:

Jay Piccirillo, MD, FACS
 CRTC Predoctoral Program Director
 Voice: (314) 362-8641
 Email: piccirij@ent.wustl.edu
 Clinical Research Training Center — TL1 Predoctoral Program
 Washington University School of Medicine
 CB 8051
 660 S. Euclid Ave.
 St. Louis, MO 63110
 Email: crtcpredoc@email.wustl.edu

Mallinckrodt Institute of Radiology Summer Research Program (MIRSRP)

Overview: For many years, the Mallinckrodt Institute of Radiology Summer Research Program (MIRSRP) has offered undergraduate and medical students an excellent introduction to current radiological sciences research. The wide variety of ongoing research programs includes:

- Breast imaging
- Cardiovascular imaging
- Contrast agent development
- Diagnostic radiology
- Digital imaging
- Magnetic resonance imaging
- Magnetic resonance spectroscopy
- Molecular pharmacology
- Neuroscience imaging
- Nuclear medicine
- Optical imaging
- Positron emission tomography
- Radiopharmaceutical development
- Ultrasound
- X-ray computed tomography

The start and finish dates of the program are flexible. To view the requirements or to download an application, visit mir.wustl.edu and choose Research/Summer Research Programs. The direct URL is mir.wustl.edu/research/summer-research-program. Information on research may be found at mir.wustl.edu/research/research-laboratories, including descriptions of the various MIR research labs and individual faculty members' research interests.

Stipend: Applicants selected to the MIR Summer Research Program will receive \$5,000 for a 10-week summer research period.

Application: Applications are due in late January prior to the summer research period. Official deadline can be checked online.

Application forms may be found online (available in November), or you may contact Kayla Corman at (314) 362-9359 or kayla.corman@wustl.edu.

Vijay Sharma, PhD
Professor of Radiology, of Neurology, and of Biomedical Engineering
Program Director, MIR Summer Research Program (MIRSRP)
ICCE Institute, Molecular Imaging Center
Washington University School of Medicine
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CB 8225
St. Louis, MO 63110
Voice: (314) 362-9358
Email: sharmav@wustl.edu

The Leah Menshouse Springer Summer Opportunities Program at Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine

Overview: The Alvin J. Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine provides opportunities for undergraduate, graduate, and medical students currently enrolled at Washington University or other accredited universities to apply to work on cancer-focused research projects during the summer. Opportunities range from basic laboratory research to clinical research to prevention/control and population research. Past research project titles include:

- Dissecting the Etiology and Progression of Hepatoblastoma
- Triple-Negative Breast Cancer: A Mechanistic Investigation of the DNA Damage Response
- Lymphopenia in Whole-Brain Radiation Treatment Therapy and Pediatric Tumor Patients
- The Impact of Rela Overexpression on Bivalent Chromatin at Key Lymphoma Oncogenes
- Triple-Negative Breast Cancer: A Mechanistic Investigation of the DNA Damage Response
- Role of Redox Signaling During Stem Cell Differentiation

Stipend and Program Dates: Applicants selected for the program will receive a stipend for a 10-week summer research period from the end of May through the beginning of August, though some flexibility is available.

Application: Requirements and the application will be available in November via the Summer Opportunities Program page on the Siteman Cancer Center website. For further information, please contact SCCSummerOpportunities@wudosis.wustl.edu.

Summer Opportunities Abroad Program (SOAP) — Forum for International Health and Tropical Medicine (FIHTM)

Overview: The SOAP's aim is to provide first-year medical students with a practical, engaging international health experience. All aspects of international health are possible focuses of a student's experience, including but not limited to: clinical exposure; public health research and implementation; tropical medicine; basic, clinical, or translational research in any topic; volunteer service; cultural or anthropological studies; or health-care system comparisons.

Students will arrange their projects with their mentors prior to applying. In order to find a project, students may review previous SOAP projects documented on FIHTM's website, find their own mentor or outside program, or speak with Gary Weil, MD, or Cynthia Wichelman, MD, faculty advisors to FIHTM for SOAP projects, for guidance in finding a project or mentor.

Two faculty who accept first-year students each year are Joaquin Barnoya, MD, MPH, who oversees chronic illness public health research in Guatemala, and Project Peanut Butter founder Mark Manary, MD, who oversees malnutrition research in Malawi. Students interested in these programs should contact Drs. Barnoya or Manary prior to applying for SOAP.

Stipend: \$3,500. Students doing research projects can also supplement this with Summer Research Program funding through the Office of Medical Student Research.

Eligibility: First-year medical students planning on completing the project during the summer before second year. Summer fellowships must be a minimum of eight weeks and must not be in locations that are under a federal travel warning.

Application: Applications are due in early February in order to allow students to consider an alternative summer experience if they are not a recipient. For more information, please contact:

Gary Weil, MD
Director of SOAP
Email: gary.j.weil@wustl.edu

Tiffany Wu
FIHTM 2018-2019 Student President
Email: tjwu@wustl.edu
Website: fihtm.wustl.edu

Summer Research Opportunities for Undergraduate Students

Summer Research Opportunities for undergraduate students involve participation in two to three months of full-time research in the following programs: Biomedical Research Apprenticeship Program (BioMedRAP), Amgen Scholars Program, BP-ENDURE St. Louis Neuroscience Pipeline Program, Opportunities in Genomics Research, Summer Research Program at the Mallinckrodt Institute of Radiology, and Summer Student Opportunities at the Siteman Cancer Center.

Biomedical Research Apprenticeship Program at Washington University in St. Louis

Overview: The Biomedical Research Apprenticeship Program (BioMedRAP) is a 10-week summer research internship for exceptional students interested in pursuing biomedical research careers. The program is designed to provide a rigorous, in-depth research experience to prepare participants for top-quality PhD and MD/PhD programs in the biomedical sciences.

As a BioMedRAP participant, you will:

- Conduct independent research with outstanding faculty mentors
- Work in a cutting-edge science and technology environment
- Gain exposure to some of the nation's finest biomedical investigators and an extensive variety of research topics
- Have the opportunity to receive individualized career counseling and develop your career interests
- Participate in workshops, seminars, and journal clubs
- Build a social network with student peers and faculty
- Prepare to apply to the best PhD and MD/PhD programs in the U.S.

Eligibility: BioMedRAP selects participants based on academic achievement, leadership, and commitment to diversity. We seek applicants who have challenged themselves and excelled academically; demonstrate experience overcoming substantial educational, cultural, or economic obstacles; are first-generation college students; or can demonstrate a strong interest in bringing diverse people together. We encourage applications from individuals who come from rural or inner-city areas and individuals from groups traditionally underrepresented in biomedical research — specifically African-Americans, Hispanic Americans, Native Americans, Pacific Islanders, women, and students with disabilities. Applications are also encouraged from international students

currently pursuing a bachelor's degree in the U.S. Individuals who have earned a baccalaureate degree and students who are not currently enrolled at a U.S. institution are not eligible to apply.

Benefits of Participation: BioMedRAP participants receive a generous research stipend for 10 weeks of residence in the program. Additionally, on-campus housing and travel to and from St. Louis are covered at no cost to the participants.

Application: The online application is available every year beginning November 1. Early application is recommended. Completed applications must be received no later than February 1.

A Diverse Community of Scholars: Washington University is committed to fostering diversity in the biomedical research community — both at our institution and beyond. By bringing together people of different backgrounds, perspectives, and talents, programs such as BioMedRAP enrich the learning experience, intellectual exchange, and pursuit of scientific discovery for all members of the academic community.

For more information, please contact:

BioMedRAP Admissions
Direct: (314) 362-7456
Toll Free: (800) 852-9074
Email: dbbs-summerresearch@wusm.wustl.edu
Website: dbbssummerresearch.wustl.edu

The Amgen Scholars Program at Washington University in St. Louis

Overview: The Amgen Scholars Program at Washington University in St. Louis is designed to recruit exceptional students interested in careers in biological and biomedical sciences with an intensive 10-week summer laboratory experience at one of the top research institutions in the nation. Scholars will engage in an independent research project under the mentorship of faculty at Washington University in St. Louis.

We will select scholars based on their academic record, ability and potential to understand scientific principles, and intellectual curiosity that will likely make them successful in a research career. Students from backgrounds historically underrepresented in the sciences are strongly encouraged to apply. We also encourage students from economically disadvantaged backgrounds and those who attend small liberal arts colleges to apply.

Eligibility: Applicants must be a U.S. citizen or permanent resident undergraduate student enrolled in a four-year college or university in the U.S., Puerto Rico, or other U.S. territory. We will focus on the applicant's demonstrated aptitude in math and science, letters of recommendation, and interest in PhD or MD/PhD

training in preparation for a career in biomedical research. Applicants must be a sophomore with four quarters or three semesters of college experience, a junior, or a non-graduating senior who is returning in the fall to continue their undergraduate studies.

Benefits of Participation: Amgen Scholars participants receive a generous research stipend for 10 weeks of residence in the program. Additionally, on-campus housing and travel to and from St. Louis are covered at no cost to the participants along with an all-expenses paid trip to participate in the annual National Amgen Scholars Symposium. A free public transportation pass for travel within the St. Louis metropolitan area also is provided.

Application: The online application is available every year beginning November 1. Early application is recommended. Completed applications must be received no later than February 1.

For more information, please contact:

Amgen Admissions
Direct: (314) 362-7456
Toll free: (800) 852-9074
Email: dbbs-summerresearch@wusm.wustl.edu
Website: dbbsummerresearch.wustl.edu

BP-ENDURE St. Louis Neuroscience Pipeline Program at Washington University

Overview: The Neuroscience Pipeline program prepares undergraduates from diverse backgrounds for neuroscience PhD programs. With support from the NIH BP-ENDURE Program and Washington University, accepted students are funded for up to two 10-week summers. The program combines research experience and a rigorous summer curriculum of courses and workshops that focus on building a foundation in neuroscience, scientific communication and admission to graduate school. During the academic year, trainees take an online class and attend and present at the Society for Neuroscience meeting to sustain and strengthen skills after the summer. In conjunction with personalized advising and an empowering community, the Pipeline offers outstanding, holistic training that budding neuroscientists will use for years to come.

Eligibility: Students are strong candidates for the Pipeline if they are: interested in research and pursuing a PhD or MD/PhD in a neuroscience-related field, enrolled full-time as an undergraduate, a U.S. citizen or permanent resident, and are from an underrepresented group (e.g. racial and ethnic minorities, students with disabilities, individuals from low income areas, and first-generation college students). All years of undergraduates are welcome to apply and previous research experience is not required.

Benefits of Participation: Benefits include a \$5,000 stipend per summer, travel funds to and from the program, university housing, and a public transportation pass for travel throughout St. Louis. The Pipeline program will fund a second summer at Washington University or another research-intensive school. Participants also have access to GRE/MCAT prep courses and funds to attend up to two scientific conferences annually. WUSTL ENDURE scholars have ample opportunities to network with all levels of neuroscientists and become part of scholarly and learning communities encouraging of their success.

Application: The online application is available every year beginning in early November. Completed applications must be received no later than February 1.

For more information, please contact:

Erik Herzog, PhD
Director, BP-ENDURE: St. Louis Neuroscience Pipeline
Diana José-Edwards, PhD
Program Coordinator, BP-ENDURE: St. Louis Neuroscience Pipeline
Voice: (314) 935-5137
Email: endure@wustl.edu
Website: endure.wustl.edu

Opportunities in Genomics Research (OGR) — Undergraduate: Scholars Program at The Elizabeth H. and James S. McDonnell III Genome Institute

Overview: The Opportunities in Genomics Research (OGR) program sponsored by McDonnell Genome Institute is designed to prepare bright, innovative, and talented students for careers in genomics and related fields. This 10-week summer program provides students with an intensive, mentored research experience. Students will be part of an excellent lab team led by one of the established scientists at Washington University School of Medicine. At the end of the program, all participants will give an oral presentation of their summer research findings. The program includes enrichment activities such as a Kaplan GRE course, journal club, career counseling/workshops, and presentation/writing skills workshops.

Provisions of the Program: Competitive stipend, on-campus housing, and travel to/from program

Requirements: Must be a sophomore, junior, or senior at a four-year institution at the time of entry into the program

GPA Requirements: Competitive or highly competitive GPA

Residency: Must be a U.S. citizen or a permanent resident

Major: Science, technology, engineering, or mathematics fields (some exceptions)

All OGR programs are funded by the NHGRI-Diversity Action Plan, which seeks to increase the number of underrepresented students in genomics. These groups include: African-Americans, Native Americans (including Alaska Natives), Native Pacific Islanders, and Hispanics, Latinos, and Chicanos. It also includes students from socioeconomically or culturally disadvantaged backgrounds and students with learning and/or physical disabilities.

For more information, contact:

Cherilynn R. Shadding, PhD
Director of Outreach, Assistant Professor, Genetics
McDonnell Genome Institute
CB 8501
4444 Forest Park Blvd.
St. Louis, MO 63108
Voice: (314) 286-1897
Email: cshadding@wustl.edu
Website: genome.wustl.edu/outreach

Mallinckrodt Institute of Radiology Summer Research Program (MIRSRP)

See Summer Research Opportunities for Medical Students, page 7.

The Leah Menhouse Springer Summer Opportunities Program at Siteman Cancer Center

See Summer Research Opportunities for Medical Students, page 8.

Clinical Research Training Center Advanced Summer Program for Investigation and Research Education (ASPIRE)

Overview: The Clinical Research Training Center Advanced Summer Program for Investigation and Research Education (ASPIRE) provides undergraduate students with an eight-week (June and July) mentored research opportunity at Washington University School of Medicine. The program is designed to immerse young investigators in clinical and translational research and also includes didactic sessions and seminars for three hours of undergraduate academic credit.

M17-404 Fundamentals of Clinical and Translational Research

- Mentored Independent Clinical Research Experience – 1 Credit
- Analysis of Clinical Data – 1 Credit
- Designing Outcomes and Clinical Research Workshop – 1 Credit

Eligibility and Requirements: Current full-time college freshmen, sophomores and juniors who wish to learn more about clinical research are eligible. Applicants must be at least 18 years of age by June 1. No prior clinical research experience is required. Scholars accepted into ASPIRE must be able to commit full-time effort (40 hours per week) to the program for the two-month duration of the appointment, successfully complete all course work, attend the Research Ethics Seminar, the “How to Present” lecture, the Friday Summer Seminar Series, as well as design and deliver a final presentation of their research work at the end of the program.

Benefits of Participation: Through ASPIRE, scholars earn three hours of undergraduate college credit, conduct mentor-supported research, obtain textbooks for training sessions, develop tools to promote an understanding of medical research, and experience networking opportunities for career building.

Tuition and Scholarships: Tuition is \$2,400. Scholarships are available.

Application: Applications to the Advanced Summer Program for Investigation and Research Education are accepted online at crtc.wustl.edu/aspire. Applications open on November 1 and close on February 20. Early application is recommended. Incomplete applications will not be considered. Prospective scholars are responsible for completing all required steps of the application, admission and enrollment processes.

More Information: For more information, including specific application requirements and instructions for submitting a scholarship request, please visit the program website at crtc.wustl.edu or contact crtc@email.wustl.edu.

One-Year Research Degree Opportunities for Medical Students

One-year research degree opportunities for medical students involve participation in one year of full-time research in the following programs: MA/MD, Master of Science in Clinical Investigation (MSCI), Master of Population Health Sciences (MPHS), Master of Public Health (MPH), and One-Year Research Without Degree (MD5).

MA/MD Degree Program

Overview: Created in 1982, the master’s degree program allows medical students to participate in cutting-edge basic biomedical research or hypothesis-driven clinical research and earn a master of arts degree in preparation for a career in academic medicine. The program is highly flexible, with an objective of providing students with an individualized research experience in an excellent environment.

Eligibility: Applications to the program will be accepted from students who are in the first three years of the medical curriculum and in good standing without encumbrances at Washington University School of Medicine.

Degree Requirements: Full-time research for one year culminating in a presentation before the research advisory committee, submission of a publication-quality manuscript of the presentation, and participation in a research ethics seminar. Additional requirements may include associated coursework and a general knowledge exam. No academic credit toward the MD degree will be given.

Funding: Fellowship stipends and other support are available through:

Howard Hughes Medical Institute (basic science or clinical research)

Website: hhmi.org/grants/individuals/medfellows.html

Those applying for HHMI funding are strongly encouraged to submit an MA/MD application no later than December 1. The MA/MD Committee will provide an initial review/feedback before the HHMI application is submitted.

Deadline for prior feedback about the HHMI application from MA/MD Committee: October 31

HHMI application deadline: early January

Clinical Research Training Center Predoctoral Program

Website: crtc.wustl.edu

Application Deadline: mid-February

MA/MD Application: All applicants must apply to the program regardless of funding source. For an application or additional information, contact:

Liz Bayer
Washington University School of Medicine
CB 8226
660 S. Euclid Ave.
St. Louis, MO 63110
Voice: (314) 362-7190
Email: bayere@wustl.edu
Website: mamd.wustl.edu

Master of Science in Clinical Investigation Degree Program (MSCI)

Overview: The Master of Science in Clinical Investigation (MSCI) Program provides high-quality, multidisciplinary training in clinical research to promote the successful career development of clinical investigators. The MSCI is available to postdoctoral scholars, junior faculty, and predoctoral students enrolled

in an established clinical research training program. Postdoctoral scholars and junior faculty must be within the medicine and allied health professions, conducting clinical research at Washington University or with an affiliated program. Predoctoral students in medicine, psychology, biology and biomedical sciences, social work, audiology, physical therapy, occupational therapy, and related disciplines in the Graduate School of Arts & Sciences who have completed or are enrolled in the intensive Predoctoral Interdisciplinary Clinical Research Training (PICRT) Program are also eligible.

Requirements: The master's program consists of 33 credits and includes the following core curriculum in clinical investigation:

- Designing Outcomes and Clinical Research or Epidemiology for Clinical Research
- Ethical and Legal Issues in Clinical Research
- Introduction to Statistics for Clinical Investigation
- Intermediate Statistics for the Health Sciences
- Intermediate Methods for Clinical and Outcomes Research

Scholars also:

- Conduct independent clinical research under the tutelage of a mentorship committee
- Participate in an ongoing seminar series to present and discuss research as a work-in-progress
- Take elective coursework related to their research interests
- Submit a final thesis consisting of a clinical research manuscript submitted to a peer-reviewed journal for publication, or completion of a biomedical entrepreneurship-related project

Advanced placement credit can be earned for past equivalent coursework as determined on an individual basis up to nine credit hours.

Tuition: Tuition for the 2018-19 academic year is \$1,315 per credit hour. Courses are open to all paying students. Trainees currently enrolled in other medicine and allied health programs should contact the program director or program coordinator to discuss entry into the MSCI program.

Location: Most courses and seminars are taught during late afternoon or early evening hours on the medical school campus.

Further Information: Visit crtc.wustl.edu or contact Suzie Fragale, curriculum and evaluation coordinator, crtcmsci@email.wustl.edu.

Master of Population Health Sciences Degree Program (MPHS)

Overview: The Master of Population Health Sciences (MPHS) program offered by the School of Medicine is a 10-month, full-time degree program for medical students, residents, fellows and attendings seeking training in clinical research methods. The curriculum emphasizes the role of clinical epidemiology and biostatistics in approaching clinical effectiveness and outcomes research for all medical fields.

The MPHS does not require a research thesis upon completion of the program. Instead, the program uses applied coursework to focus on the long-term mastery of skills. Using topics relevant to their careers and interests or research being done while in the program, MPHS students practice the art of developing research study protocols, performing systematic reviews, designing epidemiologic studies, writing grants, and much more. Many students go on to produce award-winning research using their applied coursework and skills learned in the program. Students looking for research project ideas can work with the MPHS Medical Student Mentor to find opportunities within Washington University.

MPHS students deepen their learning by choosing one of three concentrations: Clinical Epidemiology, Health Services, or Psychiatric and Behavioral Health Sciences.

Prospective Students: Applicants should be in the process of completing a degree in a clinical training program at the doctoral level or should have completed such a degree. The pace of coursework assumes students have familiarity with clinical medicine.

Program Format: For medical students, the MPHS program is a full-time, 10-month format. The maximum course load is 18 credit hours per semester.

Core MPHS Courses:

- Introduction to SAS for Clinical Research
- Introductory Biostatistics for Clinical Research
- Intermediate Biostatistics for Clinical Research
- Ethics in Population and Clinical Health Research
- Introductory Clinical Epidemiology
- Intermediate Clinical Epidemiology
- Applied Epidemiology

Information on elective courses is available at mphs.wustl.edu.

MPHS Program: The MPHS provides medical students with an opportunity to supplement their clinical training and coursework with a quantitative approach to population health research. Students develop core skills in epidemiology and biostatistics, which can be applied to research in any clinical field, from primary to specialty care. The program is intended for medical students who plan to incorporate clinical effectiveness or outcomes research into their clinical careers. The program is not restricted to Washington University medical students; students from other medical schools are encouraged to apply. Most medical students obtain their MPHS degree after the second or third year of medical school.

Application: March

Notification of Students of Admission Decision: April

Further Information: The director of the MPHS program is Graham Colditz, MD, DrPH. Additional information can be obtained at mphps.wustl.edu or by contacting the MPHS program coordinator, Blanka Hodzic, at bhodzic@wustl.edu or 314-286-0881.

Master of Public Health Degree Program (MPH)

Overview: The purpose of the joint MD/MPH degree program is to train physicians in the knowledge and skills needed to recognize, analyze, and address health problems affecting communities and society. Available exclusively to current Washington University School of Medicine students pursuing their Doctor of Medicine degree, students in this program earn a Master of Public Health degree from the Brown School in one additional year of study. Accredited by the Council on Education for Public Health since 2012, the Master of Public Health program is recognized as a pioneer in transdisciplinary problem-solving and public health research. This national “seal of approval” publicly recognizes the quality of the public health program, faculty, staff, and students. Students gain an understanding of the social, economic, environmental, and cultural determinants of health, and learn to apply evidence-based approaches to community-level disease prevention, health promotion, and health policy.

Students have access to the latest research, plus opportunities to work with faculty to explore their research interests through special projects, independent study, research assistant positions, or research-oriented fieldwork. The MPH faculty are on the forefront of chronic disease prevention, tobacco policy research, mental health, health systems science, health communications, epidemiology, violence and injury prevention, and system dynamics. The MPH is affiliated with 13 research centers and has faculty connections with numerous Washington University research centers. These centers produce groundbreaking research on health disparities, health policy, health systems, and the prevention and treatment of chronic disease.

Curriculum: 52 credits are required for the MPH degree, with a three-credit hour practicum at an approved site. Specializations are available in Epidemiology, Biostatistics, Global Health, Health Policy Analysis, and Urban Design. Core courses include:

- Health Behavior and Promotion
- Biostatistics
- Epidemiology
- Environmental Health
- Health Administration and Policy
- Transdisciplinary Problem Solving

Eligibility: Washington University medical student. Current MD students in good standing may apply for entry into the MPH program in fall of their third year of the MD program.

Funding: The tuition rate for new full-time MPH students for the 2018-2019 academic year is \$18,370 per semester. The Brown School offers generous merit-based scholarships — more than \$6 million last year — as well as need-based financial aid.

Application: Current MD students will apply for entry into the MPH program in fall of their third year through the centralized Schools of Public Health Application Service (SOPHAS) at <https://sophasexpress.liaisoncas.com>. Applications are available September 1; deadline for admission and scholarship consideration is December 15. Applicants will be notified of admission decisions by February 1; admitted students must accept/confirm intent to enroll by April 1. Please visit <https://mph.wustl.edu/apply> for more information.

Further Information: The directors of the MPH program are Will Ross, MD, MPH, at the School of Medicine (rossw@wustl.edu) and Lora Ionnatti, PhD, at the Brown School of Social Work (lionnatti@wustl.edu).

One-Year Research Without Degree Program (MD5)

Number of Participants: Available to all Washington University medical students at any point in the curriculum.

Length of Program: Completed in one year; in exceptional circumstances, a second year may be permitted.

Funding: None through Washington University School of Medicine, though students may receive a stipend from their research mentor. If a stipend is available, the primary university appointment must be as a full-time student. A secondary appointment as a predoctoral fellow, predoctoral trainee, or graduate research assistant is acceptable. These appointments may imply stipend limits. Students are not eligible for employee benefits, but the department may elect to cover student health costs under separate payment. Tax liability and withholding will depend on the appointment and the individual's circumstances.

Project Guidelines and Eligibility: Students who wish to take advantage of this program should select a research mentor and obtain permission to work with them for one year. The arrangement should then be approved by the mentor and by the Associate Dean for Medical Student Research through the application process.

Students are registered for the year for this course of study with a Pass/Fail grade option and are considered full-time students during that time. No tuition is charged. A nominal registration fee is charged, and the student health fee is charged.

Requirements:

- An independent research project must be completed.
- The application process requires a completed application form and a research proposal due one month prior to the start of the research year.
- Students and mentors are expected to meet regularly throughout the year to ensure timely progress and benefit of mentor guidance and feedback.
- No thesis is required. However, a final research report must be submitted to the mentor and the Associate Dean for Medical Student Research at the completion of the research year.
- The mentor issues to the Associate Dean for Medical Student Research a final grade of Pass or Fail and an evaluation of the student's performance at the completion of the research year. This grade will be recorded on the student's permanent academic record.

Application: Due one month prior to the start of the research year. The application and the research proposal are submitted to the Associate Dean for Medical Student Research. Students interested in the program may obtain additional information and an application by contacting:

Koong-Nah Chung, PhD
Associate Dean for Medical Student Research
Director, Office of Medical Student Research
Instructor, Cell Biology and Physiology
Washington University School of Medicine
CB 8077
660 S. Euclid Ave.
St. Louis, MO 63110
Voice: (314) 362-5464
Email: omsr@wustl.edu
Website: mdstudentresearch.wustl.edu

Roz Robinson
Project Manager/Research Administrator
Office of Medical Student Research
Voice: (314) 362-6857
Email: robinsonrb@wustl.edu

Master of Science in Applied Health Behavior Research Program

Overview: The Master of Science (MS) in Applied Health Behavior Research (AHBR) provides multidisciplinary training in applied research to gain a wider perspective of how health behaviors impact medical care and clinical outcomes through coursework, exemplary instructors, and classmates with different backgrounds, experiences, and perspectives. Applied Health Behavior Research is a transdisciplinary science that seeks to implement and evaluate effective interventions into standard practice in clinical and community settings to improve health outcomes. The degree program focuses on developing the skills required for the design, management, and evaluation of health behavior programs and research studies involving human participants. Two MS program options are available: the one-year, research intensive Master of Science in Applied Health Behavior Research and the part-time Master of Science in Applied Health Behavior Research. The part-time program offers two concentration options: Health Behavior Research (HBR) and Health Education, Program Planning & Evaluation (HEPPE). A 15 credit hour Graduate Certificate in Health Behavior Planning and Evaluation is also available.

Eligibility: The one-year option combines three semesters of coursework with nine credit hours of mentored research. It is designed for individuals planning careers in a variety of medical and health-related fields. It is an especially good fit for students interested in gaining clinical research experience during a “gap year” prior to applying to doctoral programs or medical school. A part-time option is also offered and is ideal for current Washington University employees and other professionals engaged in research in academic, clinical, and community settings, who seek a practical opportunity to cultivate new skills for career engagement and advancement.

Degree Requirements: The Master of Science program consists of 33 credits and includes the following core and concentration courses, in addition to a variety of electives:

- Project Management in Clinical & Community Settings (core)
- Health Behavior Theory (core)
- Introduction to Biostatistics (core)
- Survey Methods: Design and Evaluation (core)
- Foundations of Health Care Research (one-year program and HBR concentration)
- Mentored Research (one-year program)
- Health Education: Methods, Planning & Evaluation (HEPPE concentration)
- Evaluation of Health Services Programs (HEPPE concentration)

Tuition: Tuition for the 2018-19 academic year is \$1315 per credit hour. Washington University employees may be eligible for a 50 percent tuition assistance benefit after one year of full-time employment. The AHBR program offers additional tuition assistance to degree-seeking students.

Location: Most courses and seminars are taught during late afternoon or early evening hours on the medical school campus.

Application: Admission is on a rolling basis. Scholars may begin in fall, spring or summer semesters. To start an application, complete the application form.

Further Information: Visit <https://crtc.wustl.edu/programs/degrees/ahbr> or contact Laura Peer, project manager, at ahbr@email.wustl.edu or (314) 454-8956.

One-Year Research Funding Opportunities for Medical Students

For the MA/MD and MSCI degree programs for medical students, stipends and other support are available through the following fellowships: Howard Hughes Medical Institute, Clinical Research Training Center Predoctoral Program, and the Institutional Funding for the MA/MD Program.

Howard Hughes Medical Institute

Overview: Basic science or clinical research — hhmi.org/grants/individuals/medfellows.html

Application Deadline: early January

TL1 One-Year (Intensive) Predoctoral Clinical Research Program

Overview: The One-Year (Intensive) Predoctoral Clinical Research Program offered through the Clinical Research Training Center (CRTC) provides medical and allied health students with a one-year mentored clinical or translational research experience, didactic coursework, and career development seminars. As a core educational component of the Institute of Clinical and Translational Sciences (ICTS) at Washington University, the CRTC Predoctoral Program strives to:

- Promote clinical and translational research training for medical and allied health care predoctoral students
- Create an efficient entry into a variety of clinical research careers
- Allow flexibility to develop novel and unique clinical and translational research projects

This is a one-year, pull-out program.

Objectives: The One-Year (Intensive) Predoctoral Clinical Research Program supports a select group of trainees as they embark on careers as patient-oriented researchers by teaching them to:

- Analyze data
- Compete for research funding
- Consider relevant ethical and legal issues
- Develop and present scientific posters
- Design and conduct clinical research
- Write manuscripts and grants

Eligibility and Requirements: Doctoral-degree students in medicine, physical therapy, occupational therapy, biomedical engineering, pharmacy, audiology and communications sciences, and other allied health professions who wish to pursue academic careers in clinical and translational research are eligible. Trainees accepted into the program must be able to: commit full-time effort

to the program for the duration of the appointment (minimal duration is nine months); successfully complete all coursework per the requirements of the individual courses; participate in the annual Research Training Symposium and Poster Session in October immediately following the trainees' appointment; and attend seminars. Trainees also have the opportunity, but are not required, to pursue a Master of Science in Clinical Investigation Degree.

**TL1 One-Year (Intensive) Predoctoral Clinical Research Program
Required Courses:**

- Analysis of Clinical Data (M17-5881, Summer, 1 credit)
- Designing Outcomes and Clinical Research Workshop (M17-504, Summer, 1 credit)
- Designing Outcomes and Clinical Research (M17-513, Fall, 3 credits)
OR Epidemiology for Clinical Research (M17-588, Spring, 3 credits)
- Introduction to Statistics (M17-522, Fall, 3 credits)
- Scientific Writing and Publishing (M17-529, Spring, 2 credits)
- Ethical and Legal Issues in Clinical Research (M17-510, Fall, 2 credits)
- Pre/Postdoctoral Interdisciplinary Research Training in Translation (PIRTT) Seminar, 2 Semesters (M17-515, Fall and Spring, 2 credits per semester)

Stipend: Students receive the equivalent to the current NIH predoctoral stipend level (\$1,987 per month); students' health-care costs through Washington University are covered.

Tuition: Full tuition funding is provided for courses required by the TL1 Program. Students may be responsible for any tuition needed for additional coursework to fulfill the requirements of a master's degree program.

Application: Applications for the TL1 One-Year (Intensive) Predoctoral Clinical Research Program are accepted online at crtc.wustl.edu. Applications open in late fall of each year and close in the early spring of the following year. Prospective trainees are responsible for completing all required steps of the application, admission, and enrollment process.

More Information: For more information, including specific application and coursework requirements, please visit the program's website at crtc.wustl.edu or contact:

Jay Piccirillo, MD, FACS
CRTC Predoctoral Program Director
Voice: (314) 362-8641
Email: piccirij@ent.wustl.edu
Clinical Research Training Center — TL1 Predoctoral Program
Washington University School of Medicine
CB 8051
660 S. Euclid Ave.
St. Louis, MO 63110
Email: crtcpredoc@email.wustl.edu

One-Year Mentored Research Training Opportunity for Medical Students

The Department of Otolaryngology-Head and Neck Surgery has a T32 Predoctoral Training Program offering medical students a 12-month mentored research experience with opportunities to participate in research on many levels. Students will learn from successful program faculty conducting cutting-edge clinically relevant basic, clinical, and translational research in the auditory, vestibular, olfactory, and communication sciences. In addition, tuition is available for students who wish to take courses in clinical investigation and obtain a master's degree.

Benefits:

- Monthly stipend, research-related expenses, and health insurance
- Tuition funding for required courses — including Certificate of Clinical Investigation (CCCI) and Master of Clinical Science in Clinical Investigation (MSCI) degree
- Travel to national meetings
- Multidisciplinary seminars

Applicant Eligibility:

- Must be U.S. citizen, U.S. non-citizen national, or U.S. permanent resident and enrolled in a doctoral degree program in medicine in the U.S.
- Commit to a “year-out” opportunity (e.g., 12-month full-time research training experience)
- Support of a program-approved mentor

Application Packet: Download the application packet, complete, and submit the application by no later than April 2.

Questions: Contact Jana Richardson, program administrator, at richardsonj@wustl.edu, or Jay F. Piccirillo, MD, program director, at piccirij@ent.wustl.edu.

Medical Scientist Training Program (MSTP)

Objectives: To prepare individuals for careers in academic medicine and biotechnology. Students complete Doctor of Medicine and Doctor of Philosophy degrees with research in a medically relevant field.

Number of Participants: 25 first-year students annually. Approximately 190 students at all levels of the program.

Length of Program: Students complete the first two years of the MD curriculum, a minimum of three years of original research toward a thesis, and at least 15 months of clinical training. The program may be completed in as little as six years, though seven or eight years is the norm.

Funding: Tuition and student health fees are paid, in addition to a stipend of \$30,500 per year. Funding is provided by the NIH, the Olin Foundation, the School of Medicine, and the Graduate School of Arts & Sciences. International students receive the same level of financial support as U.S. citizens.

Eligibility: Applicants must meet the requirements for admission to the School of Medicine. While no specific undergraduate coursework is required beyond that established by the School of Medicine, individuals should have extensive preparation in their field of interest. The GRE is not accepted. Competitive applicants will have spent the equivalent of four or more semesters in laboratory research. Although most individuals enter the program at the beginning of their medical studies, medical students in the first or second year at Washington University are encouraged to apply. Student performance is reviewed annually, and high scholastic achievement is expected.

Application: Students must complete the AMCAS and the Washington University School of Medicine secondary application. Direct inquiries to:

Brian Sullivan
Executive Director of MSTP
Washington University School of Medicine
CB 8226
660 S. Euclid Ave.
St. Louis, MO 63110
Voice: (314) 362-7458
Fax: (314) 362-3369
Email: briansullivan@wustl.edu
Website: mstp.wustl.edu

Research Electives for Credit in Fourth Year for Medical Students

Number of Participants: Available to all fourth-year medical students.

Length of Program: 6-12 weeks

Funding: No remuneration is allowed for electives that are taken for academic credit. Payment or acceptance of a scholarship or stipend outside of a financial aid award for an elective for academic credit is prohibited.

Overview: To qualify for the doctor of medicine at Washington University School of Medicine, students are required to satisfactorily complete a minimum of 36 weeks of clinical or research electives in the fourth (final) year. Research electives must: a) be sponsored by a designated investigator who will outline the project, oversee the student's progress, and evaluate the student's performance; b) be accomplished while the student is enrolled at Washington University School of Medicine; c) be a project in which the student will work full-time for a total of at least six weeks; and d) be approved by the Associate Dean for Medical Student Research. Research electives are on a full-time, daily basis. There is no thesis requirement. Research electives are graded credit/no credit.

Application: Students desiring research work should arrange this with the appropriate faculty member and must file a Research Elective Proposal Form with the Electives Office at least six weeks before the research is to begin. For questions relating to scheduling of fourth-year plans, contact:

Melanie Smigielski
Manager, Electives Office
Voice: (314) 747-3854
Email: melanie_smigielski@wustl.edu
Website: md.wustl.edu/academics/curriculum/electives-fourth-year

Office of Medical Student Research
Washington University School of Medicine
660 S. Euclid Ave., CB 8077
St. Louis, MO 63110-1093
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