

Data Analytics and Healthcare Operations Internship

Position Summary: We are seeking an enthusiastic data science intern who is interested in the application of mathematical and computational techniques to solve real-world problems in healthcare. This internship is a collaboration between the Whiting School of Engineering, the Department of Emergency Medicine at Johns Hopkins School of Medicine, and the Capacity Command Center at Johns Hopkins Health System (JHHS). The student is expected to work collaboratively with JHHS operations leadership and faculty and staff within the Center for Data Science in Emergency Medicine (CDEM <https://cdem.jh.edu/>) and the Center for Systems Science and Engineering (CSSE <https://systems.jhu.edu/>). The teams are focused on the improvement of healthcare delivery using data-driven methods that include optimization modeling, advanced data visualization techniques, machine learning, large-scale electronic health record (EHR) data extraction, EHR data wrangling, and research database building. Current projects include the Perioperative Throughput Optimization Initiative, which seeks to leverage data and systems to forecast hospital occupancy and optimize surgical schedules. The intern will be directly engaged with the data science pipeline (from EHR data extraction to modeling to decision support) used to support and drive this initiative. Their work will be critical to the success of the team.

The student can expect an experience similar to a lab rotation, as well as exposure to operational and clinical workflows relevant to translational medical research. Before arrival, each intern will receive multiple papers related to their assigned project. The goal of the student's project and its relationship to other work in the area will be discussed. The student will be provided with detailed guidance needed to conduct data analysis.

The internship will start as soon as possible and is expected to last 16 weeks. There is a possibility of extension depending on the performance of the student.

Benefits for the Student: This internship is ideally suited to students with strong analytic skills and an interest in pursuing healthcare-oriented research or careers in industry or academia. Interns will acquire theoretical and practical training in advancing the practice of medicine and healthcare delivery using data science and systems engineering – with a particular focus on EHR data and optimization techniques. The intern will have access to faculty and staff in the Malone Center for Engineering in Healthcare, the Center for Systems Science and Engineering, and the Center for Data Science in Emergency Medicine. The team includes experts from the fields of operations research, biomedical engineering, and mathematical ecology – all focused on the common goal of improving care delivery for emergency department patients. The team has created important cross-disciplinary partnerships and developed novel tools that enhance the practice of emergency medicine, including through an improved approach to emergency department triage, more accurate identification of risk factors for acute kidney injury and better risk-stratification of patients with infectious disease. Experiences gained will be highly

informative and advantageous to students who plan to pursue further training (Masters, PhD or MD) or work in this arena after graduation. The project will prepare the student to showcase their skills in data analytics, analytical thinking, and operations research while solving real-world problems.

Compensation: Credit or \$15/h up to \$5,000, depending on student availability and project needs

Required Education: Undergraduate or master's students in systems engineering, computer science, applied mathematics and statistics, management sciences, biomedical engineering, or relevant fields. No previous research/industry experience is required.

Desired knowledge, skills, and abilities:

- High-level communication skills
- Strong critical thinking and analytical reasoning skills
- Proficiency with multiple programming languages (including R and Python)
- Ability to execute assigned project tasks within established schedule
- Sound documentation skills (writes and communicates clearly and concisely)
- Prior experience or knowledge in data analytics and/or optimization is desired
- Prior experience in healthcare-oriented research is desired but not necessary

Application Process: Send your resume, one-page cover letter (describing relevant course work, research experience, and/or future plans about industry/research career) and one contact info for a letter of recommendation/professional reference. Please email applications to Tracy Marshall at tmarshall@jhu.edu with the subject line "MCEH Internship application"

Application deadline: Earlier application is highly recommended. Full review is not guaranteed for applications received after January 7, 2022

Anticipated start date: As soon as possible/negotiable (duration approx. 16 weeks)