Research Internship in Systems Modeling and Optimization
Malone Center for Engineering in Healthcare

Position Summary: The student will work in a project funded by the Johns Hopkins Alliance for a Healthier World under the supervision of Diego A. Martinez, PhD (Assistant Professor, Johns Hopkins University School of Medicine). The student will work closely with students and faculty members of the Johns Hopkins University Carey School of Business and University of Chile School of Medicine. The research internship requires full commitment. It is not permissible to hold other employment during the internship. There are no vacations during the (appx) 12-week program. The student will be responsible for modeling complex problems and discovering insights from large datasets with statistical, mathematical, computational techniques. In addition to analytical skills, the student should be proficient at integrating and preparing large, varied datasets, and communicating results.

Benefits for the Student: Acquire theoretical and practical training in advancing the performance of healthcare systems developing data-enabled technology (machine learning, mathematical programming). The student can expect an experience similar to a lab rotation, as well as be out in the hospital floor to become acquainted with clinical workflows. Before arrival, the student will receive multiple papers related to their assigned project.

Compensation: $12.50/hr up to $6,000 depending on schedule and duration.

Required Education: Bachelor’s degree in mathematics, statistics, or computer science. Graduate students preferred although strong undergraduate students will be considered.

Required Experience: No previous research/industry experience required.

Desired knowledge, skills, and abilities:
- Solid knowledge of statistical and mathematical modeling techniques
- The ability to come up with solutions to loosely defined business problems by leveraging pattern detection over large datasets
- Strong programming skills (R, SQL, GAMS)
- Strong background (machine learning, time series analysis, optimization, network models in operations research)
- Must demonstrate strong critical thinking and analytical reasoning skills
- Ability to execute assigned project tasks within established schedule
- Possesses sound documentation skills; writes and communicates clearly and concisely

Application Process: Send your CV and cover letter (describing relevant course work, research experience, and/or future plans about industry/research career) to Vess Vassileva-Clarke: vclarke@jhu.edu. In your email, please include the name and email address of your academic adviser.
Subject line: MCEH Internship application _ spring 2018

Application Deadline: January 17, 2018

Anticipated Start Date: January 22, 2018, duration appx 12 weeks
**Project Description:**

<table>
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<tr>
<th><strong>Research Project</strong></th>
<th>Data-driven decision support system to reduce waiting lists in a health system serving low-income patients in Chile.</th>
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<tr>
<td><strong>Description</strong></td>
<td>A waiting list is the state of known and unsolved demand for elective surgical procedures. In Chile, over 20,000 patients on a waiting list died before their first surgical consultation and over 2,000 died before the surgery they were waiting during 2016. Our long-term objective is to develop a technology to reduce waiting lists in a health system of 5 hospitals and 80 outpatient care centers in Santiago, Chile. In this project, we will collect, analyze, and derive prediction (machine learning) and assignment (mathematical programming) models based on electronic medical records from the Chilean medical centers.</td>
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| **Tasks**            | • Weeks 1-4: Scoping the Problem—literature review of methods and application areas  
• Weeks 3-8: Constructing the database—merging, cleaning, and understanding data from disparate electronic medical records  
• Weeks 7-12: Models derivation—machine learning for patient risk stratification and/or mathematical programming for patient allocation |
| **Required Skills**  | Good background in programming (at least one class in object oriented programming and/or familiarity with R). While useful, a medical background is not required. Strong background in statistics, algebra, and/or mathematical programming (applied mathematics in general). |
| **Anticipated Start Date** | January 22, 2018 |
| **Duration of Project** | Appx 3 months |