

REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHB-25-04

Machine Learning Models for Predicting Acute Lung Injury

PROJECT DESCRIPTION: The Air Force Research Laboratory (AFRL) has a constant interest in the health and safety of all United States Air Force (USAF) personnel. To prepare for the future fight, there is a clear need to prepare for operations in extreme environments and protect our warfighters from negative impacts on health and performance impacts. Chemical, biological, and physiological stressors, such as extreme temperatures, altitude, high g-forces and hypoxia can negatively affect warfighter health and mission success. The Predictive Risk Team, within the Force Health Protection program, are building predictive computational models to identify potential health risks and streamline the health risk assessment process. Such models utilize machine learning technologies to leverage large data sets to identify key risk factors, predict exposure-response, and gauge the success of risk mitigation strategies. In this project, we are developing machine learning models to predict risk of acute lung injury to operational chemical and particulate exposures.

LEARNING OBJECTIVE: Students will support data collection, curation, and model development. Additionally, students will develop critical thinking, data analysis and scientific writing skills.

ACADEMIC LEVEL: Masters; Doctoral

DISCIPLINE NEEDED:

- Computational biology
- Systems biology
- Mathematics
- Computational modeling

RESEARCH LOCATION: Wright-Patterson Air Force Base, Dayton, Ohio

RESEARCH MENTOR: Christin M. Duran, Ph.D.

Chemical Engineering, Case Western Reserve University, 2015



Dr. Christin M Duran (Grabinski) has a PhD in chemical engineering, a professional certification in industrial hygiene, and over 18 years of research experience. During her tenure at AFRL, Dr. Duran has served as a principal investigator and lead of multiple multidisciplinary teams with expertise in a broad range of topics, including field exposure sampling, aerosol transport, sensor performance evaluation, microscopy, computational modeling, and biomarkers. She has earned multiple scientific achievement awards, including the AFRL Science and Engineering Early Career Award (2020), 711th HPW Annual Technology Management Award (2019), MHSRS Team Research Accomplishment Award (2019), and USAF School of Aerospace Medicine Annual Innovation Award (2018). Dr. Duran is an active member of the American Industrial Hygiene Association and is currently serving as the Secretary-Elect on the Real-time Detection Systems Subcommittee. Dr. Duran is a co-author on 23 peer-reviewed journal articles, 3 patents, 34 government reports, and 80 conference presentations.

RESEARCH MENTOR: Rebecca A. Clewell, Ph.D.

Environmental Science and Engineering; University of North Carolina, 2009



Dr. Rebecca Clewell is a Predictive Risk Team Lead within the Force Health Protection program in the Human Effectiveness Directorate at the 711th Human Performance Wing, Air Force Research Laboratory. Her research focuses on developing computational models to identify potential risk from operational exposures and inform risk mitigation strategies.