Personalized Physical Training Prescriptions to Optimize Warfighter Performance

PROJECT DESCRIPTION: The Signature Tracking for Optimized Nutrition and Training (STRONG) Lab is a premier exercise science facility dedicated to developing and validating human performance technologies that optimize military fitness. STRONG Lab enhances operational effectiveness through innovation, scientific validation, and collaborative development, working closely with academia and commercial industry to address real-world military challenges. A cornerstone of the STRONG Lab is its permanent cohort of 50-70 Airmen and Guardians who train in the facility. This dedicated group enables the development of personalized fitness programs tailored to individual performance profiles, occupational requirements, and personal goals, while facilitating continuous data collection through integrated wearable sensors.

STRONG Lab is seeking an intern to learn about and assist with the development of statistical models for the individualized prescription of physical training and recovery interventions. Qualified applicants should have a strong background in statistics (e.g., multifactorial models and principal component analyses) and an interest in human performance optimization. The intern will integrate into a dynamic, interdisciplinary research team, collaborating with exercise physiologists, data scientists, and military personnel, on a critical project with direct impact on warfighter readiness.

LEARNING OBJECTIVES: During this internship, the student will:
1. Gain hands-on experience in applying data science techniques to solve complex problems in human performance optimization.
2. Learn about the process of training prescription and physiological monitoring while building statistical models.
3. Communicate technical concepts through written and oral communication.

ACADEMIC LEVEL: Undergraduate; Masters; Doctoral

DISCIPLINES NEEDED: Kinesiology and Exercise physiology, Biometrics and Biostatistics, Data Science

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

RESEARCH MENTOR: Nicole Ray, Ph.D.
Mechanical Engineering, Biomechanics, University of Delaware, 2020

Dr. Nicole T. Ray is research mechanical engineer and director of the Signature Tracking for Optimized Nutrition and Training (STRONG) Laboratory at the Human Effectiveness Directorate, 711th Human Performance Wing, Air Force Research Laboratory (AFRL), Wright-Patterson Air Force Base, Ohio. She is responsible for the development and execution of research studies to enhance warfighter readiness and resilience within the STRONG portfolio. She is an expert in biomechanics and leverages this experience to lead laboratory efforts aimed toward the development of novel training technologies to promote improved performance for all groups of military personnel. Ray joined the STRONG Lab as a research scientist in 2022 after completing a post-doctoral fellowship at the Naval Medical Research Unit – Dayton (NAMRU-D) from 2020 – 2022. She earned her PhD in 2020 from the University of Delaware, and her dissertation focused on the optimization of training and rehabilitation tools to promote improved functional outcomes for stroke survivors.