DEPARTMENT OF ENVIRONMENTAL AND PUBLIC HEALTH SCIENCE
COLLEGE OF MEDICINE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2026

PROJECT TITLE: Safer 3D Printing Project

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Project Description

The Safer 3D Printing Project is a 12-week, full-time undergraduate summer research experience focused on understanding and reducing potential health risks associated with desktop 3D printing. As consumer 3D printers become faster, more automated, and more widely used in homes, schools, and makerspaces, there is a growing need to evaluate emissions—particularly airborne micro- and nanoparticles—under realistic but controlled conditions. This project directly addresses that need by combining hands-on engineering, laboratory science, and public health applications.

Undergraduate researchers will be mentored by Dr. Justin Morrow, whose background spans manufacturing science, mechanical engineering, and exposure assessment. Students will gain practical experience programming and operating high-speed consumer 3D printers from Bambu Lab, including print-farm automation hardware and software. Using custom routines developed in the lab, the student will help run accelerated printing protocols designed to rapidly generate and collect emissions under tightly controlled environmental conditions within a sealed test chamber.

A central component of the project is the use of a patent-pending dust collection and sampling system to capture particulate matter generated during printing. Students will assist with preparing samples and supporting downstream chemical analysis to characterize emissions from a wide range of commercial 3D printing filaments. By enabling rapid screening of many materials, this work contributes to evidence-based evaluation of filament safety and hazard potential.

The student will work closely with an Industrial Hygiene PhD student and be integrated into an interdisciplinary research team that bridges engineering, exposure science, and public health. Through this experience, participants will develop technical skills in additive manufacturing, automation, experimental design, and data management, while also gaining insight into how engineering innovations can be applied to protect public safety. The project emphasizes real-world impact, particularly in reducing potential childhood exposure to airborne microplastics and supporting safer use of emerging manufacturing technologies.