DEPARTMENT OF BIOMEDICAL ENGINEERING
COLLEGE OF ENGINEERING & APPLIED SCIENCE

RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: September 22, 2025

PROJECT TITLE: Environmentally-responsive delivery of therapeutics from injectable microparticles

Physical Requirement :
Must be able to lift 10 lbs

Project's Technical Skills Requirement :
Basic lab experience (using a mass balance, micropipettor, etc.) preferred but not required

Project's Available Positions : One research co-op positions available for spring 2026

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Project Description

Large-scale craniofacial bone defects, typically arising from trauma, birth defects, or complications from infection and osteomyelitis, remain particularly difficult to treat in the clinic while affecting over 400,000 Americans each year. The gold-standard treatment for these injuries remains autologous grafts harvested from a patient’s own bone, though these procedures suffer from numerous drawbacks and complications. Consequently, there remains a pressing need for off-the-shelf systems that can quickly generate healthy, highly-vascularized bone tissue for craniofacial repair. To sustainably deliver regenerative therapeutics to these bone defects, our lab has developed a number of environmentally-responsive systems for the controlled release of various drugs that can improve bone healing. Our recent work has created injectable microparticles with triggerable drug coatings that can release growth factor proteins on-demand upon deployment in a bone defect.
We are seeking a motivated student to help characterize microparticle morphology, drug loading efficiency, and drug release behavior of these fabricated systems to prepare this technology for evaluation in a pre-clinical bone defect model in rodents. We expect this project to provide

hands-on experience with polymer synthesis, microparticle fabrication, scanning electron microscopy, drug release quantification via chromatography and fluorescent microscopy, and in vitro cell culture. The student will be responsible for fabricating drug coatings, characterizing films, and measuring drug release. This project will be completed in the Bioresponsive Materials Lab in the UC Department of Biomedical Engineering alongside a team of graduate and undergraduate researchers. Moreover, this work will be done in collaboration with clinicians in the Department of Orthopedic Surgery at UC College of Medicine