Department of Biomedical Materials Science Ph.D. Program

Program Description
The didactic portion of the program includes track-specific core courses in:
- Fundamentals of Materials Science
- Fundamentals of Biomaterials
- Experimental Methods

Elective courses include:
- Medical Device Failure Analysis
- Fundamentals of Metals
- Fundamentals of Ceramics
- Fundamentals of Polymer Science
- Mathematics for Materials Study
- Statistics for Materials Study

Emphasis on a Well-Rounded Education
To prepare students to be well-rounded researchers, faculty use a variety of teaching methods. Including:
- Rotations in research labs of diverse scientific disciplines
- Opportunities to mentor high school, undergraduate, and dental students
- Participation in local, national, and international collaborations
- Coaching on how to critically evaluate the published scientific literature
- Training on multiple biomedical materials analysis techniques
- Participation in various community outreach activities

Program Outcomes
With a multifaceted training approach, the Ph.D. graduates from our program will be prepared to:
- Conduct and/or supervise original scientific research and product development activities in industrial, academic and other research settings while adhering to standards of data integrity and ethical conduct;
- Seek employment as senior scientists in industrial or regulatory settings; and
- Assume teaching positions in academic programs in materials science, including those emphasizing the use of biomedical materials in medical devices.

Recent Graduate Placements
- American Dental Association (ADA)
- Food and Drug Administration (FDA)
- Dental Industry (Colgate Palmolive, Glidewell Laboratories, GC America)
- Materials Manufacturers (Nucor Steel)
- Academia (University of Mississippi Medical Center)

Up-to-date information about the Biomedical Materials Science Ph.D. program is available online: umc.edu/bmsphd
Graduate Student Perks

• $28,000 per year stipend
• Full tuition scholarship
• Free health insurance
• Funding to attend national and international research meetings, workshops, and trainings

Admission Criteria

• B.S./M.S in an Engineering, Science, or a Healthcare Discipline
• Strong interest in Materials Science
• GRE (≥300)
• Official transcripts
• Three letters of reference
• International applicants require TOEFL (≥79) and must demonstrate a level of written and oral proficiency in English
• Apply before December 1 for full consideration
• Apply online at: umc.edu/graduateschool and select the Biomedical Sciences Ph.D. program (Biomedical Materials Science track)

Diverse Disciplinary Backgrounds

This program is truly inter-disciplinary as evidenced by the student backgrounds listed below:
• Bachelor of Dental Surgery (BDS)
• B.S. Biomedical Engineering
• B.S. Biological Engineering
• B.S. Polymer Science
• B.S. Physics
• M.S. Biological Engineering

Faculty Members & Research Interests

Amol Janorkar, Ph.D.
Professor and Interim Chair
ajanorkar@umc.edu
• Synthesis & modification of polymeric biomaterials
• Tissue engineering
• Cellular biology (obesity, liver diseases)
• Drug delivery systems

Jason A. Griggs, Ph.D., FADM
Professor and Associate Dean for Research
jagriggs@umc.edu
• Design optimization
• Fractal geometry as failure analysis tool
• Fatigue fracture of dental restorative materials & implants
• Developing more efficient fatigue test methods

Michael D. Roach, Ph.D.
Professor
mroach@umc.edu
• Development & standardization of metallic implant materials
• Bioactive, antimicrobial, & osseointegrative implant coatings
• Microstructure & chemistry/properties/failure relationships
• Additive manufacturing of implant devices
• Corrosion, fatigue, & failure analysis of implants

Yuanyuan Duan, Ph.D., B.D.S.
Associate Professor
yduan@umc.edu
• Surgical planning & computer modeling
• Fatigue lifetime prediction of dental restorations & implants
• Electrospun nanofibers & their applications
• Periodontal tissue regeneration

Susana Salazar Marocho, Ph.D., B.D.S.
Assistant Professor and Director of Graduate Program
ssalazarmarocho@umc.edu
• Characterization of ceramic structures
• Development of new approaches for bonding ceramic structures
• Laser-aided debonding for ceramics
• Mechanical behavior of ceramic materials
• Fracture analysis of dental restorative materials

R. Scott Williamson, Ph.D.
Assistant Professor
rwilliamson@umc.edu
• Modification of implant materials to promote bioactive surfaces
• Corrosion fatigue & fracture analysis of implant materials
• Additive manufacturing of implant materials
• Biomechanical evaluation of dental & orthopedic devices

Examples of Faculty Work in Research Interest Areas

Polymer-Matrix Denture Tooth that Chipped
Jason Griggs

Elastin-Collagen Based Hydrogel For Tissue Engineering
Amol Janorkar

XRD and EBSD Analyses of Crystalline Titanium Anodization Coatings
Michael Roach

Computer Modeling and Failure Analysis of a Titanium Dental Implant System
Yuanyuan Duan

3D Printed Titanium Cage
R. Scott Williamson

Laser-induced Crack in Y-TZP Ceramics
Susana Salazar Marocho

Please direct all questions to:
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