

The University of Memphis and University of Tennessee Health Science Center Together with Vanderbilt University and University of Kentucky Present

Biomaterials Day 2016

Beyond the Degree: Academia, Industry, and Entrepreneurship

The University of Memphis
FedEx Institute of Technology
Memphis, Tennessee

Friday, March 18th, 2016



Conference Program

Welcome to Biomaterials Day 2016!



Thank you for being a participant in this amazing conference for biomaterials students and professionals which provides a forum for networking and professional development. We know that our students have a strong desire to be active and contributing members in the field of biomaterials and biomedical engineering in general, and we cannot express more highly our enthusiasm to be a part of this diverse technical community. Of course our success is greatly aided by the attending faculty, industry professionals, entrepreneurs, government scientists, and diverse supporting professionals from across the fields of biology, chemistry, physics, engineering, and healthcare who have come to foster the growth of our students. Without the cumulative support of our strong and diverse community in the Mid-South, we would not be able to create the amazing success stories such as our very own SweetBio Inc. in Memphis who has successfully raised over a million dollars in funding for their biomaterial innovation. Proving further that University of Memphis students, and our peers in the mid-south, can accomplish great things with the help of great faculty mentors, surrounding partner universities, industry inspiration, and amazing entrepreneurial support.

We welcome all participants to Biomaterials Day 2016 knowing that any of you can become the next mentor or mentee of success for the Mid-South, and Memphis hopes to be the hub for the collaborations which truly make an idea become a success. Please enjoy the full program and we hope you gain valuable insight and perspective into not only the research our students are conducting but also the pathways to success our forefathers have paved for us in the field of biomaterials.

Thank you for your participation!

Christopher "Topher" Gehrman

Committee Chair, Biomaterials Day 2016 Committee

President-Elect, Society For Biomaterials, National Student Section

Graduate Research Assistant, Tissue Template Engineering and Regeneration Laboratory, Dr. Gary Bowlin

Memphis Biomaterials Day 2016 is Proudly Sponsored/Supported by:



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Society for Biomaterials Student Section

The University of Memphis SFB chapter is a member of the National Student Section and is excited to host this great event here at the University of Memphis. Our organization closely adheres to our National Goals by reaching out to the community and encouraging biomaterials education and professional development.

Mission

The purpose of the National Student Section of the Society For Biomaterials is to encourage the development, dissemination, integration, and utilization of knowledge in biomaterials among students, and encourage multi-disciplinary interactions among all members of the Society For Biomaterials.

Objective

The objectives of the Student Section of the Society For Biomaterials shall be to promote student research, education, and professional development in biomaterials and related disciplines, to promote the advancement of biomaterials research, education, and related aspects, and to further the aims and objectives of the Society For Biomaterials.

Goals

The goals of the National Student Section of the Society For Biomaterials shall be to identify students interested in biomaterials, to generate student interest and interaction in biomaterials, and to aid the efficacy of students seeking research, education, and professional development opportunities.

General Location Information

All events will be held in the FedEx Institute of Technology on the University of Memphis campus. There will be a registration booth open all day which also serves as the Information desk as well for any questions regarding room locations and assistance.

Parking

Parking is provided free of charge to attendees at the garage on Innovation drive. Parking passes will be given to any registered attendee upon proof of registration when entering the garage by an attendee.

Registration

Registration is mandatory for attending the event and is free to all attendees. Registration includes a seat to the Keynote address by Dr. John Rose, snack breaks, buffet lunch, a STEM Teaching Workshop, and a variety of biomaterials related presentations. Registration is available online and can be filled out online at any time via your mobile device or one of the computers available at the registration desk. Name tags will be available for all attendees at the time of registration confirmation near the entrance of the FedEx Institute of Technology.

Wireless Internet Access

Wireless internet for all guests can be accessed free of charge through "uofm-guest" anywhere on-campus. Directions for connection will be provided in the web browser upon connection.

Networking Lunch Buffet

Lunch will be available as a lunch buffet provided between 11:50 AM and 1:00 PM and will give opportunity for guests to explore the available booths and student posters as well as network with attendees from across the Mid-South.

Poster Presentations

Poster sessions will be split into an A and B section to accommodate all posters throughout the day. Presenters will be expected to be present next to their posters during these times in order to discuss their poster with attendees and judges. Final judging will be held during the open poster session between 3:30 PM – 4:30 PM and will be concluded with Poster awards and closing remarks.

Biomaterial Career Panels

Panels will be held throughout the day in the AutoZone auditorium with overflow available in the Methodist Auditorium via video feed. All panels will field questions from the audience and also have a moderator to keep panels on topic.

Research Presentations

Student research presentations will be given throughout the day in the Fishbowl and various rooms on the second floor. Please see the presentation times and room assignments on pages 10-13.

Coffee Breaks

Coffee breaks will be offered throughout the day in the downstairs lobby at 10:15 AM and 3:15 PM during the conference.

STEM Teaching Workshop

A workshop open to the public and offering teaching methods and practices for STEM education at all levels will be offered at 3:30 PM in the Fishbowl. Although space is limited the workshop hopes to advise a wide range of education from primary school all the way to collegiate and post-collegiate students/employees. For more information, see page 9.

**Dr. John Rose**

Principal Scientist, Biomaterials
Advanced Surgical Devices, Memphis

*Experienced Research Scientist in
Biomaterials Interfacing with the Human
Body. An Industry Professional with
Application and Implementation Expertise.*



Dr. John Rose comes to us from his current career as the principal scientist in biomaterials at Smith & Nephew, a local Memphis biomedical device company. With experience from outside the United States in Smith & Nephew, where he worked for over a decade before making the transition in 2004 to Smith & Nephew here in Memphis, Tennessee. Dr. Rose received his B.Eng. in Materials Science and Engineering from the University of Leeds in the U.K. and then acquired his Ph.D. in Physics from the same university shortly after. Focusing primarily on polymer biomaterials Dr. Rose has published papers on a wide variety of materials ranging from non-degradables, biodegradables, and even bone cement. Dr. Rose has experience in testing in-vivo and in-vitro viability studies of materials as well as wear properties and characteristics of various types of degrading and wearing materials. His experience of translating academic work and research into a successful industry career highlights the application of academia knowledge to alternative work places.

We are very pleased to have Dr. Rose speak with us this year and hope that many of the students and attendees can gain insight and motivation about the many types of post-graduation career opportunities for students of related majors in the very diverse and expansive field of biomaterials.

**Our Keynote and Welcome Ceremony Will Begin
Promptly at 9:30 AM and last until 10:15 AM**

8:30 AM – 9:30 AM	Registration and Setup <ul style="list-style-type: none">- Lobby and Front Entrance
9:30 AM – 10:15 AM	Welcome Address and Keynote Speaker <ul style="list-style-type: none">- Address in the Zone- Overflow in the Methodist Auditorium
10:15 AM - 10:30 AM	Networking Coffee Break <ul style="list-style-type: none">- In Lobby
10:30 AM – 11:50 AM	Research Presentations <ul style="list-style-type: none">- Tissue Engineering (FIT 225)- Fabrication Methods (The Fishbowl)- Simulation and Modeling/ Host Response (The Zone)
11:50 AM – 1:00 PM	Catered Lunch <ul style="list-style-type: none">- In lobby
1:00 PM – 1:45 PM	Panel: Alternative Careers <ul style="list-style-type: none">- In The Zone Poster Presentation A <ul style="list-style-type: none">- Fishbowl
1:45 PM – 2:30 PM	Panel: Academia <ul style="list-style-type: none">- In The Zone Poster Presentation B <ul style="list-style-type: none">- Lobby area with
2:30 PM – 3:15 PM	Panel: Empowering Women in Engineering <ul style="list-style-type: none">- In The Zone STEM Education Workshop Sponsored by Wright Medical <ul style="list-style-type: none">- The Fishbowl
3:15 PM – 3:30 PM	Networking Coffee Break <ul style="list-style-type: none">- In Lobby
3:30 PM – 4:30 PM	Final Posters and Judging <ul style="list-style-type: none">- The Fishbowl & FIT 225
4:30 PM – Close	Poster Awards and Closing Remarks <ul style="list-style-type: none">- Fishbowl

Academia (1:00 PM – 1:45 PM):

Open panel in the Zone with professors from University of Memphis, UTHSC, University of Kentucky, and Vanderbilt to discuss the process and field questions regarding their journey into academia and balancing work and life as a professor.

Panelists:

Dr. Chris Waters, Professor and Vice Chair Department of Physiology, UTHSC College of Medicine.

Ph. D. Biomedical Engineering, Vanderbilt University.

Dr. John T. Wilson, Assistant Professor of Chemical & Biomolecular Engineering and Biomedical Engineering (secondary), Vanderbilt University.

Ph.D. Bioengineering, Georgia Institute of Technology

Dr. Warren Haggard, Associate Dean of Research and Graduate Studies, University of Memphis.

Ph. D. Biomedical Engineering, University of Alabama at Birmingham

Dr. Robert Mihalko, J. R. Hyde Chair of Excellence in Biomechanical Engineering at the UTHSC, Orthopaedic Surgeon Campbell Clinic.

Ph. D. University of Rochester, M.D. Medical College of Virginia

Moderator:

Dr. Richard Smith, Associate Professor and Graduate Program Director, Department of Orthopedic Surgery & Biomedical Engineering.

Ph. D. Microbiology & Molecular Cell Sciences, University of Memphis

Alternative Careers (1:45 PM – 2:30 PM):

Panel including various members of government and industry specialists able to provide insight on how to succeed in biomedical jobs which are outside of academia. Also featuring entrepreneurial members of Memphis and Mid-South companies discussing their story of success in the biomedical technology field.

Panelists:

Chris Przybyszewski, Executive Vice President & Board Secretary for US Biologic

M.A. English, University of Memphis

Dr. Kerem Kalpakci, Principle R&D Engineer at Medtronic Spine & Biologics

Ph. D. Biomedical Engineering, Rice University

Panelists (Continued)

Dr. Karen Hasty, George Thomas Wilhelm Endowed Professorship in Orthopaedic Surgery within the UT-Campbell Clinic Department of Orthopaedic Surgery and Biomedical Engineering; Director of Basic Research UTHSC.

Ph. D. Anatomy, UTHSC

Moderator:

Mr. Allan Daisley, President of Zeroto510 Medical Accelerator and Director of Entrepreneurship & Sustainability at Memphis Bioworks Foundation

MBA, Duke University

Women in Engineering (2:30 PM – 3:15 PM):

Our final panel in the Zone with professors from University of Memphis and UTHSC as well as other professionals in industry or government positions. We will discuss and field questions regarding their experience, triumphs, and struggles in becoming a successful professional in the field of biomedical sciences.

Panelists:

Dr. Amy De Jonhg-Curry, Professor and Graduate/Undergraduate Coordinator, University of Memphis Department of Biomedical Engineering.

Ph. D. Biomedical Engineering, University of Memphis

Dr. Ashley Parker, Research and Development Engineer at Microport Orthopedics.

Ph. D. Biomedical Engineering, University of Memphis

Lauralan Terrill-Grisoni, Vice President Reconstruction-Global Knees at Smith & Nephew

Mary Anthony, Senior Program Director, Global PLM, Advanced Surgical Devices Division at Smith & Nephew

Moderator:

Dr. Esra Roan, Professor, University of Memphis Department of Biomedical Engineering

Ph. D. Mechanical Engineering, University of Cincinnati

Communicating the Ideas of Today to the Scientists of the Future!

Wright Medical is a proud sponsor of our Biomaterials Day 2016 STEM education workshop looking to increase the communication of biomaterials education from primary school classrooms through collegiate and post-collegiate training. Our focus entails the use of self-reflection and thorough assessment to optimize creative activities which adapt difficult STEM topics for specialized professionals as well as lay audiences.

For those knowledgeable in the current pedagogical methods a popular standard exists known as Bloom's Taxonomy. This theory simplifies the importance and structure of various stages of understanding in the learning process into a hierarchy of emphasis. Although memorization is important this is only seen as a basic form of learning and being able to analyze and create are the most important stages of learning new material. However, the often forgotten bridging aspect between analyzing an idea and creating a new idea during learning is to evaluate the knowledge through reflection and group evaluations.

This important step is often overlooked or under-emphasized and is crucial for finding knowledge gaps and fortifying the foundation of our knowledge before moving our analysis into a creating step. This also applies to our ability to retain information as well. Through teaching we can create new knowledge in other students and by understanding our own knowledge enough to teach to others we can have a strengthening of our own knowledge base. Using an application of effective evaluation and reflection, we can improve our ability to analyze and create as well as teach others more successfully.

Teaching is a dynamic process and we hope to expand the diagnostic tools which will help educators and their students gain the most from difficult subjects in technical fields such as biomaterials. Our workshop will provide a brief activity and demonstration of these methods which will then be followed by an explanation and discussion on how these methods can be expanded or implemented in individual settings based on the audience's needs. This workshop aims to help educators and collegiate students reach out to both undergraduates and also their surrounding communities.

Bloom's Taxonomy Applied to Teaching



Fabrication Methods (FIT 225)

10:30 AM-10:50 AM

Altering hydrophilic siRNA polyplex corona chemistry by zwitteration or sialylation to improve intravenous pharmacokinetics.

Meredith A. Jackson, Eric A. Dailing, Zoe E. Johnson, Thomas A. Werfel, Todd D. Giorgio, Craig L. Duvall
Vanderbilt University

10:50 AM-11:10 AM

Characterization of poly(simvastatin)-containing copolymers and blends

T.A. Asafo-Adjeil, T.D. Dziubla, D.A. Puleo
University of Kentucky

11:10 AM-11:30 AM

3D Printing of Bone-Templated Scaffolds

JP Vanderburgh, S Lu, SJ Fernando, A Merkel, JA Sterling, SA Guelcher
Vanderbilt University

11:30 AM-11:50 AM

In Situ Crosslinked Endosomolytic Polymer Vesicles for Versatile Delivery to Cytosolic Immune Surveillance Receptors

Daniel Shae, Anna Caldwell, Sema Sevimli, John T. Wilson
Vanderbilt University

Tissue Engineering (The Zone)

10:30AM-10:50AM

Remodeling of an injectable, settable, and cell-degradable composite bone cement with bone-like strength in a rabbit femoral plug defect model.

Madison A.P. McEnery, Sichang Lu, Mukesh K. Gupta, Katarzyna J. Zienkiewicz, Daniel Shimko, Kerem N. Kalpakci, Craig L. Duvall, Scott A. Guelcher
Vanderbilt University

10:50 AM-11:10 AM

Local Delivery of siRNA from ROS-Degradable Scaffolds to Promote Diabetic Wound Healing.

John R. Martin, Christopher E. Nelson, Mukesh K. Gupta, Fang Yu, Kyle Hocking, Scott A. Guelcher, Jeffrey M. Davidson, Craig L. Duvall
Vanderbilt University

Host Response (The Zone)*11:10 AM-11:30 AM***Mechanism of Enhanced Cellular Uptake and Cytosolic Retention of MK2 Inhibitory Peptide Nanopolyplexes.****Kameron V Kilchrist**, Brian C Evans, Colleen M Brophy, Craig L. Duvall
*Vanderbilt University**11:30 AM-11:50 AM***Measuring and Modeling Elution of Cis 2-Decenoic Acid from Phosphatidylcholine coatings.****Michael Harris**, Elysia Masters, Ravi Patel, Jessica Amber Jennings
*University of Memphis***Simulation and Modeling (The Fishbowl)***10:30 AM-10:50 AM***Investigation of Delamination Resistant Bio-Laminates Using Finite Element Modeling Methods****Matt Nelms**, Dr. Wayne Hodo, Dr. Arunachalam Rajendran
*Ole Miss**10:50 AM-11:10 AM***PSMA antibody functionalized docetaxel-loaded superparamagnetic iron oxide nanoparticles for prostate cancer therapy.****Murali M. Yallapu**, Prashanth K.B. Nagesh, Nia R. Johnson, Vijaya K.N. Boya, Pallabita Chowdhury, Bilal B. Hafeez, Shadi F. Othman, Vahid Khalilzad-Sharghi, Aditya Ganju, Sheema Khan, Stephen W. Behrman, Nadeem Zafar, Subhash C. Chauhan, Meena Jaggi
*UTHSC**11:10 AM-11:30 AM***Novel Interaction of HER2 with MUC13 in Aggressive Pancreatic Ductal Adenocarcinoma****Subhash C. Chauhan**, Sheema Khan, Mara C. Ebeling, Mohammad Sikander, Murali M. Yallapu, Tomoko Ise, Satoshi Nagata, Nadeem Zafar, Stephen W. Behrman, Jim Y. Wan, Hemendra M. Ghimire, Peeyush Sahay, Prabhakar Pradhan, Meena Jaggi
UTHSC

Poster Group A (Fishbowl)

1:00 PM – 1:45 PM

A Novel Platform Technology for Cytosolic Peptide Delivery with Endosomolytic Nano-Polyplexes Applied to Vascular Graft Intimal Hyperplasia.

Evans BC, Hocking KM, Osgood MJ, Voskresensky I, Dmowska J, Kilchrist KV, Brophy CM, Duvall CL
Vanderbilt University

pH-Responsive Polyplex Nanovaccines for Enhancing MHC Class-I Presentation of Peptide Antigens.

Feng Qiu, John T. Wilson
Vanderbilt University

Alternative and accelerated degradation method to increase physiological representation.

Carlos M. Wells, Michael Harris, Marmadou Diallo, Warren Haggard, Jessica A. Jennings
University of Memphis

Release of Adenosine from Chitosan Beads.

Allen Mamaril, Parwinder Singh, Ravi Patel, Joel D. Bumgardner, Jessica A. Jennings
University of Memphis

Targeted Nanoparticles for Delivery of Short Interfering RNA for Prevention of Post-traumatic Osteoarthritis.

Sean Bedingfield, Taylor Kavanaugh, Thomas Werfel, Christy Patterson, Karen Hasty, Craig Duvall
Vanderbilt University

Utilizing Poloxamer 407 As A Nucleus Pulposus Regeneration Scaffold.

Nicholas A. Temofeew, Katherine R. Hixon, Scott A. Sell
Saint Louis University

Release and Activity of Adenosine Incorporated Into Calcium Sulfate.
Ravi Patel

University of Memphis

Photosensitizer-loaded Gold Nanorods for Near-Infrared Photodynamic and Photothermal Cancer Therapy.

Ryan T O'Connor, Saheel Bhana, Xiaohua Huang
University of Memphis

Effect on Degrade Rate of Chitosan with Removal of Residual Materials.

Matthew Weaver, Osheana Jenkins
University of Memphis

Development of a Silk Fibroin/Poloxamer Electrospun Scaffold for Skin Tissue Engineering.

Parin U. Kadakia, Scott A. Sell
Saint Louis University

Protection of Pancreatic Islets in ROS Sponge Hydrogels for Type 1 Diabetes Therapy.

Bryan Dollinger, Mukesh Gupta, John Martin, Craig Duvall
Vanderbilt University

Growth plate cartilage microstructure under physiological and hyperphysiological conditions.

Bhavya Vendra
University of Memphis

Poster Group B (Fishbowl)

1:45 PM – 2:30 PM

Cis 2-decenoic acid interacts with bacterial cell membranes to potentiate additive and synergistic responses against biofilm in orthopaedic pathogens.

Elysia Masters, Michael Harris, Jessica Amber Jennings
University of Memphis

Analysis of the Deposited Matrix on Synthetic Scaffolds Subjected to Mechanostimulation to Improve Tendon Injuries at the Enthesis.

Jonathan Tapp, Mamadou Diallo, Christopher Alexander, Joel D. Bumgardner, Warren Haggard, Jessica Amber Jennings,
University of Memphis

Use of calcium phosphate- silver nanoparticles in chitosan coatings on titanium and for drug delivery.

Gillen Gonzales
University of Memphis

Optimizing pH-responsive Nanoparticles for Delivery of Immunostimulatory Nucleic Acids to Cytosolic Immune Surveillance Pathways.

Max Jacobson, Katie Bumila, Sema Sevimli, John T. Wilson
Vanderbilt University

Incorporation of Platelet Rich Plasma into Silk Fibroin Electrospun Scaffolds to Stimulate Wound Healing.

Andrew J. Dunn, Paul N. Richard, Scott A. Sell
Saint Louis University

Regulation of Isocitrate Dehydrogenase 1 (IDH1) Activity using Smart Nanomaterials Delivering CRISPR Technology.

Kavya Sharman, Gerardo Valadez, Michael Cooper, Todd Giorgio
Vanderbilt University

Concentrically and Axially Graded Hybrid Polymeric Scaffolds.

Amir Najarzadeh
University of Kentucky

Chitosan Paste as Local Delivery Device to Lower Diffusion Distance of Antibiotics.

Joel Martin Berretta
University of Memphis

Stimulating Pulmonary Immunity with pH-Responsive Nanoparticle Vaccines.

Frances C. Knight, Pavlo Gilchuk, Sema Sevimli, Sebastian Joyce, and John T. Wilson
Vanderbilt University

Evaluation of Chitosan Paste as a Local Antibiotic Delivery Alternative.

Christopher Alexander
University of Memphis

Spinal Implant's Vancomycin Elution Analysis.

Parwinder Singh
University of Memphis

Adenosine Increases Chemotactic Migration of Stem Cells.

Mamadou Diallo, J. Amber Jennings
University of Memphis

We wish to thank all of our partners and sponsors, without whom this event would not have been possible.

We would like to acknowledge the FedEx Institute of Technology for graciously providing the venue and for facilitating all arrangements for food and refreshments. They made it possible for us to present the smooth and polished event that you see.

Special thanks to the Society for Biomaterials for providing a grant which gave us the opportunity to support Memphis Biomaterials Day 2016. Their gracious support allowed us to produce this event free of charge.

We wish to recognize Wright Medical Technology for providing the funding necessary to present the STEM education workshop, which will provide valuable resources to educators. Their assistance is invaluable to providing such an important outreach activity for the community at large.

Thanks to Smith & Nephew for making it possible for our keynote speaker, Dr. John Rose to join us this year. Their kind support underscores their commitment to the research and education community.

Special thanks to the Engineering Student Council of the Herff College of Engineering at the University of Memphis for providing additional sponsorship and funding to make this event possible for our student organization.

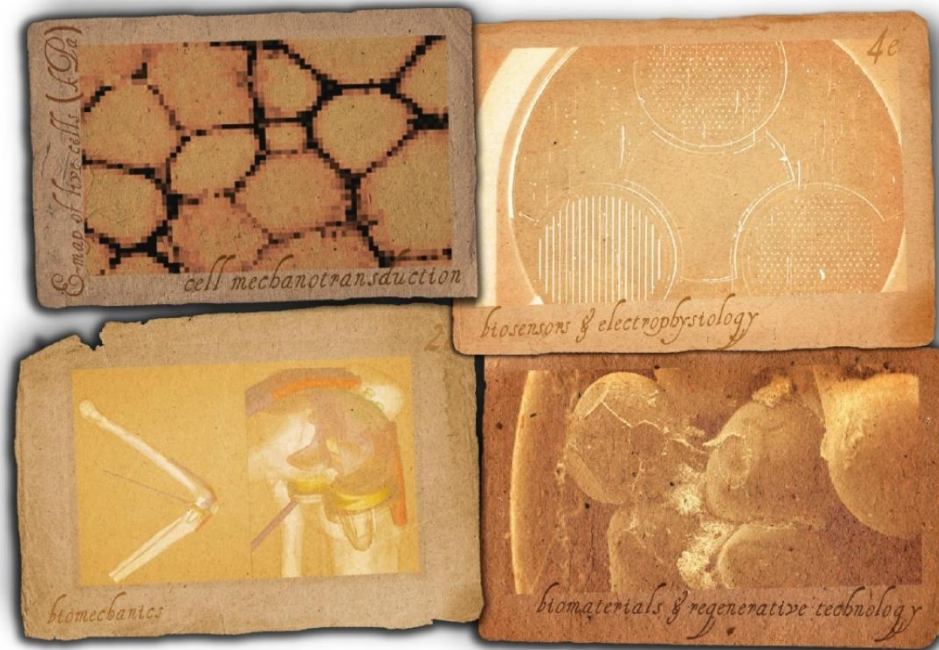
All food and beverages were provided by the Holiday Inn and FedEx Institute of Technology catering services.

Finally, we want to acknowledge all 2016 Memphis Biomaterials Day committee members and volunteers who worked tirelessly to organize this year's event.

Committee Chair: Christopher Gehrman

Committee Members: Allison Fetz, Joshua Herwig, Gretchen Selders, James Tatum, and Bhavya Vendra.

And of course thank you to all of our panelists, speakers, presenters, and attendees!



University of Memphis & University of Tennessee Health Science Center Joint Graduate Program in Biomedical Engineering

The UM/UT joint graduate program in biomedical engineering offers master's of science (thesis and project options) and doctoral degrees.

A Bachelor of Science in Biomedical Engineering degree is offered through the University of Memphis Herff College of Engineering. The program stresses the application of engineering and physical science to biomedical problems, including research and development of new technologies. Life science, applied mathematics and engineering comprise the core curriculum.

This program provides science and technology for the world and provides our students excellent opportunities for research and employment.

The program includes four areas of emphasis: biomechanics, biosensors and electrophysiology, biomaterials and regenerative technology, and bioimaging.

www.uthsc.edu/bme or www.memphis.edu/bme

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