OVERVIEW STATEMENT

Biomedical engineering is an exciting field that is concerned with the application of engineering and science methodologies to the analysis of biological and physiological problems including the delivery of health care. Biomedical engineering involves developing devices and procedures that solve medical and health-related problems by combining knowledge of biology and medicine with engineering principles and practices. The biomedical engineer requires the analytical tools and broad physical knowledge of modern engineering and science, fundamental understanding of the biological or physiological system and familiarity with recent technological breakthroughs.

Enter the dynamic field of biomedical engineering and find yourself in the middle of one of the fastest growing disciplines that straddles both the world of engineering and science. Graduates with a degree in biomedical engineering are critical for meeting the growing needs of an aging population with a focus on health issues requiring better, more technologically advanced medical devices and equipment. With the need for more sophisticated medical equipment and procedures, an increased concern for cost-effectiveness will boost demand for students interested in pursuing a biomedical engineering career. Because of the growing interest in this field, the number of degrees granted in biomedical engineering has increased greatly.

Biomedical engineering careers are expected to have employment growth of 62 percent over the next decade, much faster than the average for all occupations. (See the Department of Labor statistics at www.bls.gov/oco/ocos027.htm#projections_data).

According to the Biomedical Engineering Society, this field of study has the highest percentage of female students in all of the engineering specialties.

Graduates in biomedical engineering work with medical scientists to develop and evaluate systems and products such as artificial organs, prostheses (artificial devices that replace missing body parts), instrumentation for imaging and treatment, medical information systems, health management and care delivery systems. Biomedical engineers use their knowledge to create new equipment or environments for such purposes as maximizing human performance or providing non-invasive diagnostic tools.

The aging of the population and a growing focus on health issues will drive demand for better medical devices and equipment designed by biomedical engineers. Along with the need for more sophisticated medical equipment and procedures, an increased concern for cost-effectiveness will boost demand for biomedical engineers.

The B.S. degree in biomedical engineering also prepares students with an interest in medical careers for medical school. Biomedical engineering is one of many majors offered at Florida Tech that serve as preparation and meet all the entry requirements for further training in medical, dental or allied health professions.

The education experience is enriched through design courses where students work as teams to solve biomedical engineering problems and interact with local practicing physicians through internship opportunities.
Graduates of top biomedical engineering school programs are highly skilled engineers who understand the ethical, social and economic implications of their work and can fill diverse professional roles in industry, graduate school and medical professions.

Our mission is to ensure that our graduates have the knowledge and skills to choose the future they want. Collaborative efforts between Florida Tech faculty and the local medical community offer unique research learning experiences for engineering and premed students.

SAMPLE RESEARCH PROJECTS

Lasers for Cancer Detection and Therapy: Research is ongoing to develop ultra-short pulse laser based system for early cancer detection and therapy. This technique is non-invasive, fast and safe compared to existing imaging and treatment modalities.

Vascular Tissue Engineering: The focus of this research is elucidating how cells interact with their microenvironment, such as topography and scaffold composition, and using this knowledge to develop strategies to produce tissue engineered grafts. The goal is to overcome the current challenges to producing a viable replacement for occluded coronary or peripheral arteries. The research will involve several of the steps required for producing a clinical product, including scaffold fabrication, cell culture analysis and the initial steps of translation.

Medical Imaging: Current projects involve the application of advanced signal and image processing to enhance medical imagery. A method has been developed that reduces noise from computed tomography (CT), which is induced when the X-ray dose is decreased, making CT scans safer for patients. A similar approach has been used for nuclear medicine imagery.

Neural Engineering: Research is focused on application of stimulator(s) to the central and peripheral nervous system to restore neurological function following stroke, spinal cord injury, cerebral palsy and intractable pain.

Orthopaedic Biomechanics: Current research is focused on the application novel modeling methods of viscoelasticity in biological structures such as bone and cartilage. This project will aid in understanding post-surgery stress distribution in the repaired clavicle, aimed at reducing fracture re-occurrence.

BioSensors: Ongoing activities include biosensor development for non-invasive glucose monitoring using an artificial neural network discriminator.

Cardiovascular Engineering: This research is focused on developing innovative techniques and devices for the detection and therapy of cardiovascular diseases such as myocardial ischemia, cardiac arrhythmia, hypertension, hemorrhagic shock, and procedures including angioplasty/stent placement and hemodynamic monitoring. One example is using ultrasound technology, contrast agents and stem cells to repair vascular damage caused by stent placement.

Center for Medical Materials and Photonics will provide premiere programs in the following areas: Third-generation bioactive materials, including bioactive materials for regenerative medicine, load bearing orthopedic and dental devices, intelligent wound care systems and materials for sports medicine repair and reconstruction; medical photonics, including laser and bio-Raman-based cancer detection and therapeutics, human cell based-screening for toxicology, pharmaceutical and biomaterials screening, and patient-specific diagnosis and therapy analyses.

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