FIU BIOMEDICAL ENGINEERING INSTITUTE
FLORIDA INTERNATIONAL UNIVERSITY
Integrating Academia, Clinical Medicine and the Biomedical Industry

COLLEGE OF ENGINEERING
STATS
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Message from the Director

Biomedical Engineering at FIU is a teenager in the grips of a growth hormone spike. As a parent it's fun to watch and see changes every time you turn around, and for the teenager it is a time to establish your own identity and make choices for your future.

As promised in our last STATS, we are implementing this Fall term a new and innovative BS program in biomedical engineering.The field of biomedical engineering is still teetering between defining itself as a science-based or applications-based discipline. This is certainly one reason for the immensely broad range of curricula topics and foci of biomedical engineering BS programs. Yet another reason may be the broad medical device industry that these programs target as customers for their product (the students). As the automation industry (i.e. automobile, etc) defined mechanical engineering and the electronics industry defined electrical engineering, we believe a focus on the drug delivery/tissue engineering industry as a target customer for BS graduates will help to solidify BME as a discrete, independent discipline. Our full range of programs (BS in BME, combined BS/MS in ME/BME, combined BS/MS in EE/BME) then provides the medical device industries (drug delivery/tissue engineering, mechanical medical devices, and medical instrumentation, respectively) with graduates fully prepared for their disparate needs.

Students in our new BS program will also have a choice of industry experience for their senior design project: either clinical/industry sponsorship on a product development enterprise or entry into a technology entrepreneurship program/competition (see accompanying story). Graduates of the program will thus be prepared for the large corporate world or for entrepreneurial ventures, depending on their personality and interest.

But biomedical engineering at FIU has not reached adulthood yet. Plans are underway for a PhD program and a new Department of Biomedical Engineering. Stay tuned.

Dr. Richard T. Schoephoerster, Director
BMEI

Bachelor of Science in Biomedical Engineering Set to Start Fall 2002

On May 22nd, Florida International University's Board of Trustees approved the expansion of the biomedical engineering program to include a Bachelor of Science degree program in the Fall 2002 semester.

With the implementation of the new program, FIU will be Florida's first public university to offer a bachelor's degree in biomedical engineering. While other institutions across the nation offer similar programs that focus on the mechanical and electrical engineering background, FIU's program puts greater emphasis on the life sciences, primarily biology and chemistry, to prepare graduates for the challenges of the 21st century in tissue engineering. "We have chosen to focus our degree on tissue engineering, built on a solid foundation of engineering fundamentals. Our expectation is that the growing field of tissue engineering will need people with this combination of expertise," predicts director of CVEC, Dr. James Moore.

The advantages of preceding an already-offered Master of Science in Biomedical Engineering with undergraduate work are tremendous: biomedical engineering background allows graduate students better understanding of the integration between biological systems and chemical processes through methods in engineering; gives them a solid background in engineering and life sciences; and will help to increase the availability of highly-skilled engineers who are ready to enter one of the fastest growing industries in the country and South Florida in particular. "We expect that our program, with the

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Biomedical Engineering Partner Sponsors New Award for Students

Howard J. Leonhardt and Dr. Richard T. Schoephoerster

BMEI Partnership Program Advisory Board member, Howard J. Leonhardt of Bioheart, Inc., the College of Engineering and College of Business Administration have recently partnered to offer a new opportunity for students who would like to develop and apply entrepreneurship skills in an industrial setting.

The Howard J. Leonhardt New Venture Challenge will offer several awards. One special "technology" award in the amount of $5,000 will be awarded to the winner who presents a panel from various business, technology, and venture capital industry organizations in South Florida with the best business plan for their technologically based enterprise.

Applications for the competition are due by November 22, 2002 and are available at the NVC web site: http://www.fiu.edu/~nvc

This award is part of the cooperation between BMEI partners, the College of Engineering and College of Business Administration, which also produced an expected grant for $600,000 over the next two years from the National Science Foundation. The grant will support the development of competitions, as well as the implementation of collaborative technology innovation program and the establishment of a technology entrepreneurship and innovation center at FIU.

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Biomedical Engineering Society

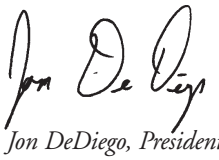
Message from the President

Dear Students,

Welcome to the new academic year, a year poised for great strides in FIU's Biomedical Engineering Society. This past spring, BMES elected new officers, attended biotech conferences, and finished off the semester with a student vs. faculty softball game. This coming fall semester, BMES has plans to attend the Annual Biomedical Engineering Society Meeting, have two barbecues for fundraising, attend more Biotech conferences, participate in student government functions, and as always, invite and welcome new members to the society.

Apart from the society's activities, the new Bachelors of Science in Biomedical Engineering program offers a great opportunity for new students and new members of the society. With biomedical engineering being one of the fastest growing industries in the country and South Florida rapidly becoming the place to be for biomedical companies, a degree in biomedical engineering will be the most valuable ingredient for students interested in this field.

BMES invites all students interested in biomedical engineering to at least get information on the degree and inquire about the society. We offer industrial exposure, a platform for the free exchange of ideas ranging from dissertation topics to what will be served in the next barbecue, and an important asset to add onto any resume.



Jon DeDiego, President BMES at FIU

ALUMNI EDGE

>> Vijay Yeluri

>> BMEI Graduate Takes His Knowledge to Stanford's School of Medicine

When Vijay Yeluri joined the Biomedical Engineering Institute in September 2000, little did he know what opportunities would come his way.

Originally from New Delhi, India, Yeluri found out about Florida International University and BMEI through the website. "I looked at the institute's website," he says, "and I was impressed with the research the institute is currently engaged in, specifically at CVEC," he explains.

Before arriving at FIU, Yeluri studied electronics engineering at Regional Engineering College in Allahabad, India. "Allahabad University is one of the most renowned universities in India," says Yeluri. "Nehru, our first prime minister, established the College of Engineering in 1961."

As part of his training after completing his bachelor's degree, Yeluri joined General Electric for an internship during the summer of 2001 and worked on developing a demo of the new PET/CT for the Society of Nuclear Medicine show, which was to be held in Toronto. "My work with GE Medical Systems inspired me to continue with biomedical engineering," he explains about his passion for biomedical education. "I was working on the software aspects of the MRI scanner and I wanted to learn more about it and about the physics that drive medical scanners - the core medical concepts behind it."

After graduating from FIU with a Master's degree in Biomedical Engineering, Yeluri joined Stanford University, where he is currently working as a research and development engineer at the school of medicine. His work involves enhancing and adding new features to the PACS system, which allows efficient transfer of patient information between departments.

Yeluri attributes a great deal of his success to BMEI. "BMEI has transformed me from being a software engineer to a biomedical engineer. The foundations that BMEI instilled in me helped me understand my work better. It helped me increase my knowledge base and broaden my horizon."

STUDENT SPOTLIGHT

>> Mariana Oliva

Mariana Oliva joined the College of Engineering in the summer of 1998. "I could not decide between engineering and pre-medicine," says Oliva. "But, I learned more about biomedical engineering from the faculty and now I can enjoy both worlds," she explains.

Born in Havana, Cuba, Oliva united with her father in Miami in 1996, when she was 21. "It always interested us how living in the United States would be," she reveals of her childhood feelings. "Growing up in Cuba, we did not have all the luxuries many have here; we had only half an hour of cartoons."

And what does it look like after living here for the past six years?

"Life here in Miami is definitely fast-paced. In Cuba the day pasts much slower and people do not rush in their daily activities as much as they do here. But I like it very much here."

Oliva always knew she wanted to work in science, but after the collapse of the Soviet Union, in 1991, she realized her best opportunities would arise in the United States. "In Cuba, the education was really good, but there were no opportunities to work after graduation."

In her spare time, Olive enjoys dancing and playing the flute, in which she excelled while at Barbara Goleman High School marching band.

Topics in Student Research

>> Nuclear Medicine and Image Analysis

The aim of student research, currently performed in the department of nuclear medicine at Baptist hospital, is to evaluate the performance of PET/CT systems and to develop applications for its images in the planning of radiation treatments.

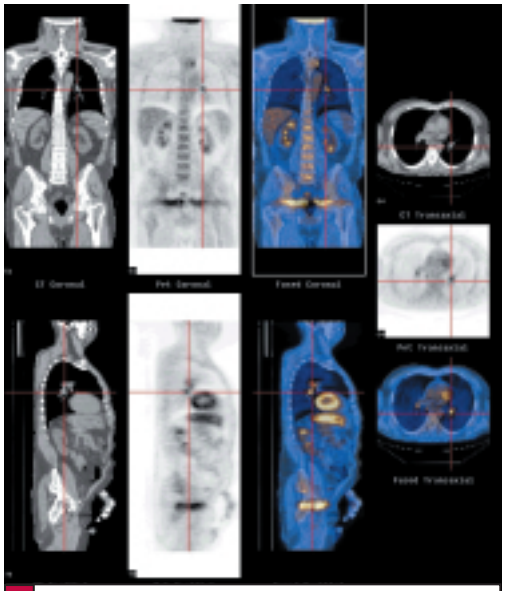
Kranthi Kandagatla, Swapna Chigurupati, Madmu Durai, and Santosh Keni, all graduate students at BMEI, are in charge of the testing, with Dr. Juan Franquiz, who specializes in nuclear medicine, Dr. Anthony McGoron, and Dr. Jack Ziffer, director of nuclear medicine at Baptist, supervising.

Computerized Tomography (CT) images have been used routinely for planning of radiation treatment with external gamma ray beams. The transmission of the beams shows the structure and anatomy of human organs and lesions. Similarly, Positron Emission Tomography (PET) images depict metabolic information that helps with early diagnosis of malignant tumors and to differentiate them from benign lesions. Depending on the uptake of a radioactive agent - the radiotracer, these images reveal the tumor and all regions within the tumor in which cancer cells are more active, and therefore need treatment.

"The current trend in tomography is to create hybrid systems of PET and CT capabilities, which need further assessment," says Kandagatla.

In order to utilize 2D and 3D PET/CT images more accurately, the group is developing a software toolbox that will allow better fusion, view, handle, and quantitative analysis and will improve the planning of radiation treatment of tumors. "The images will be registered automatically and will decrease the time of patient review," says Keni.

The research is scheduled to be completed by April of 2003 with its results published in medical journals following that.



A PET/CT lung cancer image, courtesy of GEMS

BMEI Students and Dr. Franquiz at Baptist Hospital

FACULTY FOCUS

>> Eric Crumpler

Eric Crumpler joined the Biomedical Engineering Institute in August 2000 after he completed his post-doctorate work at the Massachusetts Institute of Technology (MIT).

Crumpler, whose expertise in tissue engineering and drug delivery systems is playing a significant role in expanding our program, admits his passion for his work: "I am passionate about teaching students – not just teaching them the needed material, but also how to advance in our profession. I try to instill real-world experiences in my classroom," he explains. Crumpler says that his experiences had taught him to appreciate it.

Growing up in Michigan, Crumpler attended a public school until seventh grade. Later, he joined the University of Detroit High School – a private catholic school where he experimented in chemistry. "I always wanted to become a chemist," he shares. "It was the only thing I was really good at; I made my first polymer, Nylon 6,6, in tenth grade."

Majoring in chemical engineering at Michigan State University seemed a natural transition for Crumpler. However, after a brief period in the Air Force, he graduated as a Spartan with degrees in chemistry and in German. "In high school, all I learned was Latin, so later I tried something completely different in German," he says of his linguistic background.

Dr. Crumpler holds many suggestions for students, but his main advice for them is to prepare themselves for their future career by being responsible students and giving their best effort in the classroom. "In the past, FIU's environment was not as challenging as it could have been, but I think that now, when we are marching to become a major research university, this will change and benefit our students," he summarizes.

BMEI Partners Share Their Wisdom with Students

During the summer, the Biomedical Engineering Institute hosted two lectures by representatives from our industry partners: Fernando Sanchez from MD International, Inc., and Dr. Michael Brown from Bioheart, Inc.

Mr. Sanchez, Vice President at MD International, explained the approach his company is taking to satisfy the needs of its target market in Latin America. "It is very important to know your target audience," he said. "In our case, we created a showroom that can help our customers to visualize all their needs – some of which they cannot see in hospitals in their native countries."

Mr. Sanchez also emphasized what his company was looking for in applicants. "When we are evaluating candidates, we are looking for honesty; respect for people, culture, and assets; and efficiency."

Dr. Brown, Bioheart's Chief Scientific Officer and Vice President of Clinical Affairs, described his company's focus on regeneration of heart muscle that assumes cardiac workload. He gave an overview of the development of new drugs and how to gain FDA approval through the example of Bioheart's Myocell' Cultured Autologous Myoblasts.

According to Dr. Brown, getting the approval is a lengthy and often expensive procedure. "The process, from pre-clinical safety studies through an approval to market the product may take 5-10 years and cost around $100 million," he said. "It all depends on how urgent it is from the disease-prevention perspective – some research is fast-forwarded and some takes longer to finish," he suggested.

Fernando Sanchez and Dr. Michael Brown visited the Biomedical Engineering Institute as part of our unique Biomedical Engineering Partnership Program. Through this program, our students and faculty, as well as the industrial and clinical partners benefit from constant interaction, which brings many opportunities for growth such as the Research Initiation and the Internship programs.

Biomedical Engineering Courses Fall 2002

UNDERGRADUATE COURSES

Course	Title	Credits	Instructor
BME 2990	BME Modeling and Simulation	3	McGoron
BME 3991	Eng Analysis of Biological Syst I	3	Crumpler
BME 3990	BME Data Evaluation Principles	3	Schoephoerster
BME 4011	Clinical Rotation for Bio Eng	1	Franquiz
EGM 3503	Applied Mechanics	3	Moore
EGM 4583	Orthopaedic Biomechanics	3	Rincon
ELR 4202C	Medical Instrumentation	4	Heimer

GRADUATE COURSES

Course	Title	Credits	Instructor
BME 5990	Nonlinear Sys Apps Life Science	3	Yaylali
EGM 6588	Solid Mech Apps Physio Sys	3	Rincon
EEL 6075	Biosignal Processing I	3	Barreto

Dr. Goyal Joins BMEI as Visiting Professor

Dr. Megh Goyal, professor in fluid dynamics from the University of Puerto Rico – Mayagüez, has recently joined the Biomedical Engineering Institute as a visiting professor for the 2002-2003 academic year.

For the past 12 years, Dr. Goyal, a faculty member at UPR since 1979, has been devoted to the teaching of fluid mechanics, biofluid dynamics, mechanics of materials, and thermodynamics, among others and recently, in the summer of 2001, organized the first congress on biofluid dynamics for human body systems in Puerto Rico.

With the experience he gains at BMEI, and a result of his research while at FIU, Dr. Goyal hopes to develop an initial draft of his proposed textbook on biofluid dynamics of human body systems, as well as to build courses and, eventually, a biomedical engineering program at his university.

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Bachelor of Science in Biomedical Engineering Set to Start Fall 2002

support of South Florida's biomedical industry, will be supplying productive graduates for many years to come," says Dr. Moore.

For those who choose to pursue medical education, the new program will offer 20 semester hours in life sciences, including biology, chemistry, organic chemistry, and biochemistry, as well as 48 semester hours in biomedical engineering courses that will cover cellular and systems physiology, and a three course sequence of engineering fundamentals that will put them at the edge of future medical technologies. "It is our prediction that in the near future, biomedical engineering will be the most common route to medical school, along with biology," says BMEI director, Dr. Richard Schoephoerster. "Biomedical engineering provides future physicians with the necessary technical background they will need to flourish in the medical field ten years from now and beyond," he explains.

After five years of wait, with the addition of the Bachelor of Science degree, FIU's biomedical engineering program can now look forward to our next challenge – adding a Ph.D. program, which would make FIU the only state university in Florida to offer an entire slate of degree programs in biomedical engineering, furthering our pursuit for excellence.

Biomedical Engineering STATS

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