Fall 2003

BME STATS Fall 2003

Department of Biomedical Engineering, Florida International University

COLLEGE OF ENGINEERING

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

STATS

Fall 2003 Volume 3 • Number 1

DEPARTMENT OF BIOMEDICAL ENGINEERING NEWSLETTER

HTTP://WWW.BME.FIU.EDU

Message from the Chair

It is a privilege to be addressing you as the inaugural Chair of the newly established Department of Biomedical Engineering. The creation of a new department is always a major step, so with this act the University has made a significant investment in biomedical engineering. It also acknowledges the tremendous effort by the faculty and staff over the years in the development of our research and education programs, and reinforces the commitment to our faculty, students, partners, and to all of our constituents, that biomedical engineering is here to stay at FIU.

But this is not a time to rest on our laurels and say, "we have arrived." We will continue to build research and education programs that are on the forefront of technology and innovation. Two examples of this commitment are witnessed in this issue of STATS. Entrepreneurship skills such as leadership, communication, opportunity assessment and project planning and management are essential for the career advancement of any engineer and particularly for the biomedical engineer in the entrepreneurial environment of our field. We are taking a leading role in a university-wide effort to integrate entrepreneurship into the education of both undergraduate and graduate students.

The new faculty hires are also leading us into the new and exciting fields of bionanotechnology and systems biology. These areas of research spring from our growing knowledge of human biology and our inclusion of expertise in these areas supports our vision of biomedical engineering as an applied biology-based discipline.

The next major milestone in the development of our research and education programs will be the implementation of the PhD program. We hope to report on that in our next newsletter issue.

Dr. Richard T. Schoephoerster, Director
BME

BME: Newly Declared Department

July 2003 marked a milestone in the history of the Biomedical Engineering (BME) program at the Florida International University College of Engineering. After four successful years, the BME joined Civil and Environmental, Industrial and Systems, Electrical and Computer and Mechanical and Materials engineering as well as Construction Management to become one of six declared departments at FIU's College of Engineering.

BME Professor and Chair Richard Schoephoerster says that the change from institute to department will positively affect the quality of education received by students of the BME department with such things as expanded course offerings, for example, and will make a significant difference in the way the outside world looks at biomedical engineering education at FIU. "Becoming a department makes a huge difference in the number of students we attract, the way other universities see us and the level of permanence we hold," said Schoephoerster.

The Biomedical Engineering Institute was established in 1999 and began by offering only a master's degree program. The creation of the institute was the response to a growing interest in biomedical engineering. Soon after BME began offering the master's degree program, a bachelor's program was implemented. The approval of the Bachelor's of Science in

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Howard J. Leonhardt New Venture Challenge (HJL NVC)

Howard J. Leonhardt

Innovation has always been at the forefront of our everyday lives. However, innovation would not be as powerful as it is if it weren't for the entrepreneurship initiatives that business people take to bring new ideas to our attention. It is for that reason that the College of Engineering and the College of Business Administration at FIU have come together through the Howard J. Leonhardt (HJL) New Venture Challenge: An International Business Plan Competition. The purpose of the HJL New Venture Challenge is to combine technological innovation with the business acumen required to bring that innovation to the marketplace: to transform new ideas into vital business enterprises.

The HJL New Venture Challenge is the new edition of the Net-Biz Challenge Business Plan Competition, which was offered from 2000 to 2002. Both the HJL New Venture Challenge and the Net-Biz Challenge Business Plan Competition are driven by student demand and work in conjunction with the College of Business Administration's focus on entrepreneurship. With the partnership between the

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Inside This Issue

Biomedical Engineering Society

Message from the President

The Biomedical Engineering Society at Florida International University elected a new, energetic group of students to lead the society through the following year. Estela Gonzalez was elected vice president; Delhy Arias will be the new secretary; Rosaura DeZayas will be the treasurer; Varinia Consiglio and Jose Cesar will both be student representatives; Joanna Naranjo will be the webmaster; and Karym Urdaneta was appointed to a newly formed position, public relations officer. The torch was passed on to these officers during the E-Week festivities in February.

So far this year, the BMES has participated in conferences, fundraising, community service events, and functions organized by student government. BMES student members have been given the opportunity to volunteer at different conferences including ISET and the 2003 Summer Bioengineering Conference. In what is fast becoming a tradition in the society, a student versus faculty softball game was held during E-Week, but unfortunately for the students, the faculty was once again victorious.

The BMES officers aim to grow and develop the society and continue to provide students with the opportunity to participate in conferences and events locally and nationally. A few events on the roster include guest speakers, car washes and other fund raising events, community service events including toy drives and food drives. The aim of the society is to provide its members the opportunity to learn more about the biomedical engineering profession though interaction with members of the industry and education alike. We hope to provide students an environment where they can learn from and interact with each other in order to make their college experience a more fulfilling one.

Siobhain Gallocher, BMES President at FIU

ALUMNI EDGE

>> Samuel Robaina

While few college graduates fully utilize the skills learned during their time as students, FIU BME alumni Samuel Robaina is definitely putting to use what he learned as a student.

Robaina began working toward his Master's in Biomedical Engineering in August 1999. During his time as a BME student, Robaina conducted research in the area of cardiovascular biomechanics, stents, and platelet deposition. After he completed his research, he attended a conference in North Carolina, where an engineer from the Boston Scientific Corporation approached him with interest in his research. Robaina kept in contact with Boston Scientific and after graduating from FIU in May 2002 he was offered a job there, where he is now a research and development engineer.

At Boston Scientific, Robaina is proud to say that he is using some of the skills he learned while attending FIU. "I'm actually very lucky to be able to apply what I learned in my courses at the BME. I am especially making use of the overall research principles I had to apply while I was doing research there as a student," said Robaina. Although Robaina is thankful for being able to utilize his classroom skills in a practical work environment, he does admit that one thing is completely different. "When I was in graduate school, I had this one big project and enough time to work on it. Now, I have 12 to 15 of those same projects and deadlines to commit to," said Robaina. While he is currently enjoying balancing his projects at Boston Scientific, Robaina does look forward to working on his PhD in the near future.

STUDENT SPOTLIGHT

>> Nandini Duraiswamy

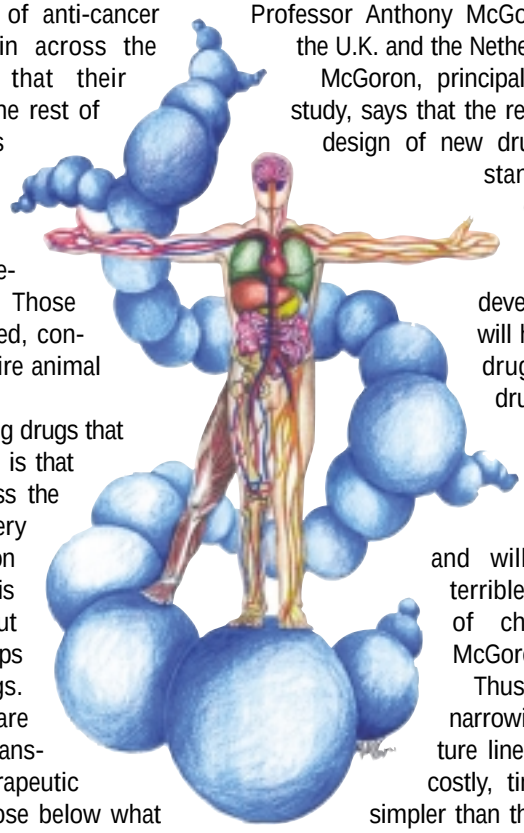
Nandini Duraiswamy was born in India and received her Bachelor's in Medical Electronics there in 1997. She then decided that she wanted to move to the U.S. to receive her master's. In 1998, Duraiswamy began working toward her master's degree in biomedical engineering at the Texas A & M University. Duraiswamy recalls that nothing about her move from India to the U.S. was harder than having to accommodate to life on her own. "Back in India, I had my mother and father to take care of me, I had my entire family to depend on, and I had excellent job stability. When I moved here, I had to learn how to do things for myself and had to adjust to being away from my family," said Duraiswamy. After graduating from Texas A & M University in 2000, Duraiswamy moved to Oregon to work for a pacemaker company and later moved to Miami in 2002 to reunite with her husband, who had been working here in Miami while she worked in Oregon.

Duraiswamy began attending FIU in June 2002 and hopes to graduate in the next two years. She is currently conducting research in the BME Cardiovascular Engineering Center. During the time that she has been in the U.S., Duraiswamy has returned to India twice to visit her family. They are all extremely proud of the things she has accomplished and how far she has gotten in her studies. "My family, especially my mother, father, and husband are very proud of me, but I am not even close to done. I want to continue learning and feel that up to this point, the hard times of learning to live on my own have been worth every minute," said Duraiswamy.

Topics in Student Research

>> Blood-Brain-Barrier Model

Student research on the establishment of in-vitro blood-brain-barriers using three different commercially available cell lines is currently being performed in the grounds of the Engineering Center. The research objective is to test drug delivery of anti-cancer medicines into the brain across the blood-brain-barrier so that their toxicity is decreased in the rest of the body. The study is being conducted to develop tools to better understand techniques that improve the effectiveness of existing drugs. Those tools are cell culture based, controllable, and do not require animal experimentation.



The problem with existing drugs that treat diseases of the brain is that they enter the brain across the blood-brain-barrier at very low amounts. The function of the blood-brain-barrier is to protect the brain, but unfortunately it also keeps out therapeutic drugs. Therefore, researchers are looking to improve this transport by increasing the therapeutic effect of the drug at a dose below what may be toxic.

The research began in March of 2002 and is being conducted by BME students Punkaj Gupta, Rajendra Boldhane and Dehly Arias. The long-term objective of the study is to reduce the toxicity of the anti-cancer medicines so that the therapeutic effect of the drug remains the same even at lower doses. Gupta, Boldhane and Arias are collaborating with BME Professor Anthony McGoron and doctors in the U.K. and the Netherlands.

McGoron, principal investigator in the study, says that the results will help in the design of new drugs and the understanding of already existing drugs. "The importance of this study lies in the development of tools that will help us design better drugs and understand drugs that are currently available. This information will result in better treatment of cancer patients and will help reduce the terrible toxic side effects of chemotherapy," said McGoron.

Thus far, researchers are narrowing in on a cell culture line that should be less costly, time consuming, and simpler than those described in literature. This phase of the research is set to finish in one to two years and the establishment of a model with validation will take an additional two to three months.

Congress on Biofluid Dynamics is a Success

The Congress on Biofluid Dynamics: Human Body Systems took place on the grounds of the Engineering Center on Thursday, April 17, 2003. The one-day congress was sponsored by the BME and the BMES. Some of the topics included in the Congress were the Human Circulatory System, Human Digestive System, Human Maternal Fetal System, Drug Delivery to the Human Body System and Cardiopulmonary Surgery. Conference organizers included the students of the Principles of Human Body Systems and Applied Body Systems classes and University of Puerto Rico – Mayaguez Professor Megh Goyal. Keynote Speaker Baruch Lieber, known internationally for his research in the area of biofluid mechanics, provided a strong anchor to a very interesting set of topics.

FACULTY FOCUS

>> Malek Adjouadi

Before joining FIU in August 1990, Malek Adjouadi served for three years as an assistant professor at the University of Hawaii and two years as a lieutenant in the military service. Currently, Adjouadi holds a joint faculty position between the departments of electrical and computer engineering (ECE) and the BME. Since the Fall of 1993, he has been serving as director of the National Science Foundation (NSF) funded Center for Advanced Technology and Education (CATE). But before Adjouadi's significant achievements and triumphs in education, there were humble beginnings.

Adjouadi was born in Algeria in a small village called Ait Soula in the mountains of Djurdjura. As a native Berber, and like all families then, everyone lived off the land and herding and agriculture were the means of life. His family fled the small village during the Algerian-French war and migrated to the capital after their home was destroyed during a raid by the French air force.

Now, sitting in his office in the BME, Adjouadi speaks about his research interests and where he wants to go from here. "To enhance the research capabilities of the BME department, I am working with leaders of the Miami Children's Hospital and FIU to establish a new neuroengineering program and I'm very much looking forward to that," said Adjouadi.

Biomedical Engineering Courses Fall 2003

UNDERGRADUATE COURSES

Course	Title	Credits	Instructor
BME 2990	BME Simulation	3	Tsoukias
BME 3991	Eng. An Bio Sys II	3	Crumpler
BME 4011	Clinical Rotations	1	Franquiz
BME 3990	BME Data Eval Prin	3	Schoephoerster
BME 3992	BME Transport	3	McGoron
EEL 3003	Electrical Engr I	3	E&CE
BME 4090	Design Proj Org	3	Schoephoerster/Amit
BME 4991L	BME Lab I	1	Byrne
BME 4990	Biomaterials	3	Crumpler
EML 4585	Des Biomed Devices	3	Schoephoerster
BME 4991	Radiological Eng.	3	Franquiz
EGM 4580	Prin Of Bio-Eng	3	McGoron

GRADUATE COURSES

Course	Title	Credits	Instructor
EEL 6075	Biosignal Processing	3	Barreto
EEL 5071	Bioelectrical Models	3	Heimer
BME 6991C	Protein Engineering	3	Renugopalakrishnan
BME 5990	Nonlin Sys Life Sci	3	Yaylali
BME 5992C	Radiological Eng	3	Franquiz
BME 6936	BME Seminar	1	Renugopalakrishnan
BME 5991	Appl Bio Eng Princ	3	McGoron
EEL 5810	Neural Networks	3	Ayala
BME 5993	Int Cardiovasc Eng	3	Team

New Faculty

V. RENUGOPALAKRISHNAN (RENU)

Ph.D., SUNY at Buffalo
Wallace H. Coulter Eminent Scholar in Biomedical Engineering

Research Area: Phospho and glycoproteins: Structure, dynamics and engineering and neuropeptides and proteins, bio/nanotechnology, protein for information storage (next generation CD/DVD technology).
Patents: Ten (disclosures made)
Publications: over 150
Founder of BioFold, being incubated at NASA-Ames and invested by NEC.

NIKOLAOS TSOUKIAS

PhD., University of California, Irvine, 1999
Assistant Professor
Over three years as postdoctoral fellow at
John Hopkins University School of Medicine.

Research Area:
Angiogenesis and tissue oxygenation, computer simulations of oxygen transport, nitric oxide transport in microcirculation in presence of hemoglobin-based blood substitutes.
Publications: Over 25

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BME: Newly Declared Department

Biomedical Engineering was also a historical step for the Florida State University System because it made FIU the first public university in Florida to offer a bachelor's degree in biomedical engineering. Schoephoerster explained that since its inception, the BME Institute had plans to become a department, "From the beginning, our goal was to become a department and Dean Prasad and the BME faculty and staff supported that effort. Therefore, being an institute was a temporary housing for the BME program and the establishment of the department is a culmination of our hard work."

The BME department has submitted a proposal for a PhD program. The proposal has been approved throughout the university and is undergoing the review process from the Florida Board of Education.

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Howard J. Leonhardt (HJL) New Venture Challenge

College of Engineering and the College of Business Administration, both colleges hope to encourage entrepreneurship among students and look to add another practical dimension to business and engineering education.

At the forefront of the HJL Challenge is Howard J. Leonhardt, Bioheart, Inc. founder, chairman and chief executive officer. Leonhardt, businessman and entrepreneur in the field of biomedical engineering, is the primary sponsor of the business plan competition. For his dedication to the advancement of the biomedical engineering industry and the study and development of entrepreneurship and innovation in the South Florida region, FIU's Hall of Fame recognized him as the 2003 South Florida Entrepreneur of the Year.

Biomedical Engineering STATS

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Biomedical Engineering STATS, the Newsletter of the Department of Biomedical Engineering is published biannually.

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