Fall 2005

BME STATS Fall 2005

Deparment of Biomedical Engineering, Florida International Univeristy

BME Awards 2005

Anuradha Godavarty, *Assistant Professor of Biomedical Engineering,* received the Sylvia Sorkin Greenfield Award for the best paper (outside of radiation dosimetry) published in Medical Physics in 2004. Dr. Godavarty was chosen for her paper "Fluorescence-Enhanced Optical Imaging of Large Phantoms Using Single and Simultaneous Dual Point Illumination Geometries." The award was presented at the AAPM Meeting in Seattle on July 25, 2005. The article appears in the February 2004 issue of Medical Physics.

Nicolaos Tsoukias, *Assistant Professor of Biomedical Engineering,* won the prestigious Arthur C. Guyton Award for Excellence in Integrative Physiology for 2006 from the American Physiology Society. One award is given annually to an independent investigator who holds an academic rank no higher than assistant professor and is pursuing research that utilizes quantitative and integrative approaches and feedback control system theory for the study of physiological functions.

Melissa E. Jahangiri *('07) received one of two 2005 HENAAC Student Leadership Awards.* In addition to grade point average, the selection committee considered leadership and campus and community service. The prize, which was awarded at the Oct. 7, 2005 HENAAC Awards Ceremony, included a $5,000 scholarship, hotel accommodations and airfare to the ceremony in Anaheim, California. HENAAC was established in 1989 to honor the contributions of outstanding Hispanic American students and professionals in science, engineering, technology and math.

Ronald Gutierrez, *PhD student in Biomedical Engineering,* was one of 4 FIU recipients of the CyberBridges Fellowship. The goal of CyberBridges is to bridge the divide between the Information Technology communities and the science disciplines by presenting students with an avenue where they can explore applications of Cyber Infrastructure research within their domains. Selected fellowship awardees will conduct research and perform experiments alongside CI research scientists. Ronald will be working under the supervision of Dr. Eric Crumpler, Assistant Professor of Biomedical Engineering, on a project entitled "Computational Enhanced Mesh Design in Tissue Engineering: Measuring Wall Shear Stress in Cell/Scaffolds."

Though only in its second year, BME has already emerged as a leader in Presidential Fellowships at FIU. In spring, four of the department's new PhD admittees received the honor, providing half of the College of Engineering and Computing's eight fellowships. A total of twenty awards were given university wide. Last year, BME's fledgling department received two fellowships. As of Fall 2004, there were fifty-six engineering students in the Honors College. Sixteen of them were biomedical engineering students, the largest number from any engineering program, despite BME having the smallest program in terms of numbers of students. Approximately, 15 percent of BME's students are in the Honors College, compared to approximately three to five percent of the FIU student body.

New Faculty

>> Dr. Rebecca Anderson

Dr. Rebecca Anderson

In the future when you need an organ transplant, instead of searching for a suitable donor, doctors will create the organ. At least that's the dream of Rebecca Anderson, a new Instructor and Undergraduate Advisor in FIU's Biomedical Engineering Department.

"During my doctoral studies, I became very interested in tissue regeneration using bioreactors designed by NASA. In the future, it is possible that tissue regeneration in these bioreactors may make obsolete the need for organ donors for organ transplantation."

Dr. Anderson, who joined FIU's faculty in August and teaches Biomaterials Sciences, is especially interested in regeneration of tissue in the cardiovascular system and improving prosthetic vascular grafts, as well as incorporating aspects of nanotechnology. That kind of research requires cooperation between academia, clinical institutions and the biomedical industry. Dr. Anderson is adept at making those connections. "One of my strengths is my ability to establish collaboration between engineers, physicians and basic scientists. In previous positions, I established a strong collaboration between the Department of Anatomy in the College of Medicine at the University of South Florida and the Department of Biomedical Engineering at the University of Florida."

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BME class graduates

BME started out as part of FIU's ME program. However, with biomedical one of the fastest growing sectors, it was time to spin it off to its own program. The number of biomedical engineering jobs will increase by 31.4 percent through 2010 according to the U.S. Department of Labor. The rapid rise is in part due to an aging U.S. population and the increasing demand for improved medical devices and systems. BME's undergraduate program is on target to fill those jobs. Students took such classes as BME Modeling and Simulation, Cell and Tissue Engineering, and Design of Biomedical Systems & Devices. These classes, combined with the required hands-on laboratory experience and senior projects, gave the graduates the tools they needed to acquire good jobs in the biosciences industry. "We've produced a unique opportunity for our students. What's most satisfying is that they are going out into the workplace and are attractive to industry," said Richard Schoepshoerster, BME Chair.

So, where are they now? Marcus Lowe went to Bausch & Lomb and Delhy Arias joined BioHeart. Some went to pharmaceutical or other companies with a biotechnology focus. Still others continue studies and research at educational institutions. BME continues to expand. The fledgling undergraduate program has grown to over 125 students.

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Tenure

serving as Co-PI on other grants within and outside the college. He is the faculty advisor to the student chapter of BMES, and a member of BMES, Sigma Xi Scientific Research Society, and American Heart Association.

Dr. McGoron works on drug delivery and drug transport modeling, the focus of which is the design of new drugs, and developing strategies to monitor and improve drug transport to target tissue. His most recent publication in a professional journal is "Computer Phantom Study of Brain PET Glucose Metabolism Imaging Using a Rotating SPECT/PET Camera."

Biomedical Engineering STATS

Contributors: *Richard Schoephoerster, Diana del Rio, Diane Marshall, Oscar Negret.*

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FIU Florida International University — Department of BIOMEDICAL ENGINEERING
COLLEGE OF ENGINEERING
10555 West Flagler Street
EC 2600
Miami, Florida 33199
http://www.bme.fiu.edu
BME office: 305-348-6950
Email: bmeinfo@fiu.edu

FIU Florida International University — Department of BIOMEDICAL ENGINEERING
COLLEGE OF ENGINEERING
Integrating Academia, Clinical Medicine and the Biomedical Industry

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Message from the Chair

Certainly one of the most rewarding aspects of my duties as Chair is to attend the commencement ceremonies each December and May. I really enjoy all the pomp and circumstance that goes with graduation. It is a time of reflection on past achievements of our students, and a time of anticipation of their future glory and accomplishments. It is why we as faculty are in the field of education.

This past year was especially gratifying because the Department graduated its first set of students with a baccalaureate in Biomedical Engineering. Just as the first-born always holds special stature within a family, so to does the first set of graduates from a program hold special stature for a Department. Oh, there will be more students (many more), but we are extremely proud of our new graduates and their accomplishments (see articles in this newsletter for some examples), and they will always be our first.

And many more students there are. We are fast approaching 150 students at the undergraduate level, and 50 at the graduate level. More importantly, however, is the high quality of students that we are attracting. The BME programs boast one of the highest percentages, within the University, of undergraduate students in the Honors program, and of FIU Presidential Fellowship awardees at the graduate level. In addition to academic accolades, our current students are also active outside of the classroom, as evidenced by the many activities of and awards given to the FIU student BMES (see their column).

Our primary educational objective is to provide an education that prepares these new graduates for life after their degree. We have established learning outcomes that will give the graduates the skills they need to meet our objective. And we have developed unique tools to measure learning via their performance in the BME laboratory courses and Senior Design Project. Initial reactions from companies that have hired our students indicate that we are on the right track.

Dr. Richard T. Schoephoerster, Director
BME

First undergraduate BME class graduates

This past year, the first undergraduate BME class graduated with fifteen students. Getting to graduation was a challenging, but rewarding, journey for students and faculty. While the students started in 2002, it took almost five years to develop the program. Committees began by putting together a curriculum that would satisfy the faculty, college, university, state, and, for the future, ABET, the recognized accreditor for applied science, computing, engineering, and technology.

The resulting curriculum is a cutting-edge cooperative venture between FIU, clinical providers and bioscience firms. "We feel we put together a firm foundation for the biotech industry. It meets the criteria of the school, state and ABET and provides opportunities to work with clinical and industry partners," explained Dr. Anthony McGoron, BME Undergraduate Program Director. The school has to have graduates to get its ABET accreditation. This class puts us closer to that goal."

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Fall 2004 graduates.

Spring 2005 graduates.

First tenured faculty member in Biomedical Engineering

Dr. Anthony McGoron

BME had much to celebrate this year: The department awarded its first undergraduate degrees and Associate Professor Anthony McGoron was awarded the first tenure in the department. It's especially rewarding for Dr. McGoron, who serves as the BME Undergraduate Program Director. "It's significant for me and the department. A department can't be permanent unless the faculty have tenure, and ABET looks for senior and junior faculty when it evaluates for accreditation," said Dr. McGoron.

In awarding tenure a university looks at a professor's teaching, research and service. Since joining FIU in 1999, Dr. McGoron has made significant and novel contributions in all three areas. His work on the Curriculum Committee for the BS program in Biomedical Engineering resulted in the establishment of the department's BME program, and he graduated the department's very first graduate student.

Additionally, he has brought research money and prestige to the university by receiving the three-year American Heart Association Initial Investigator Award, an STTR grant from the NSF, an AREA award from the NIH, as well as

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Inside This Issue

Biomedical Engineering Society

Message from the President

The Biomedical Engineering Society at FIU is moving at full steam with an executive board, once comprised of six officers, and now up to ten. Melissa Montalvo, FIU's former Engineering Student Council President is our Vice President; Maria Jaramillo is our Recording Secretary; Paola Hegedus is Senior Secretary; Varinia Consigilio, currently one of the department's graduate students, and Jean Chery are our Student Representatives; Mario Cifuntes is our Events Coordinator; Eduardo Diaz is the Marketing Coordinator; Shabnam Namin, who is currently interning at Bioheart, was chosen as our Public Relations officer; and Mirtou Aime is our Treasurer. Since the inception of BMES, we have had great participation from the undergraduate and graduate students, and now BMES student membership has risen to over 80 members this year. The overwhelming participation of our members is outstanding.

Once again we were bestowed the honor of attaining the most Outstanding Engineering Organization for the 2004-2005 school year. Not only have we been recognized locally, but nationally as well. As a member of the National Chapter of BMES, we travel every year to the National BMES conference. This year 23 members were able to attend, and for the second consecutive year we were awarded the "Fleetest Feet Award", which recognizes the chapter represented by the most students who travel the most miles. BMES was also recognized in the National BMES Bulletin by contributing an article about our society and the accomplishments we have made in just a few short years. This has given BMES and the Department exposure at the national level. We maintain relationships with local industry by participating in BioTec 2005, ISET 2005, and plans to attend the 2006 Summer Bioengineering Conference.

And finally, we unveiled our new website. Take a look and see the exciting things we did last year and what we plan for the future. (http://students.eng.fiu.edu/%7Ebmes/)

Diana del Rio

ALUMNI EDGE

>> Marcus Lowe

When Marcus Lowe aced out applicants with Master and Ph.D. degrees for a position as a research engineer at Bausch & Lomb, he attributed it to FIU's outstanding BME curriculum. "The job would more likely go to someone with a higher degree, and they would be assigned to assist on a project before they got their own," said Lowe, who recently earned a BS and was nominated for the Outstanding Student Award in BME's first undergraduate class.

FIU's BME program gave him skills and experience that the others did not have. "FIU's program requires students to work on several projects including a senior design project. I took a class called Design of Biomedical Systems and Devices, which really helped me. Now I'm working on implantable devices.

Two other programs were also advantageous. An internship at Rochal in his senior year gave him industrial experience and taught him about polymer chemistry, which he will be using in his new position. Perhaps most valuable, were the presentations he made in several of his classes. "At FIU, a lot of classes required us to do a presentation paper. That helped because I had to give a presentation for my interview. Having done several presentations for school made the interview less difficult."

Lowe sees himself climbing the corporate ladder. However, at Bausch & Lomb, the ladder is not typical. "We have a Technical Ladder. We can develop and gain promotions through technical expertise rather than the traditional management ladder. Although he has only been with Bausch & Lomb for ten months, his boss has already put his name forward for a career-development award.

The 35-year-old research engineer was born in Stroud, England, but came to the United States 1988. When not working, he's often on the soccer field or volleyball court, or just taking it easy. He lives in Rochester, New York, and has a son, six, and a daughter, nine. His fiancé is a BME Ph.D. candidate at FIU.

STUDENT SPOTLIGHT

>> Delhy Arias

Along with a BS degree in BME, Delhy Arias took home the Outstanding Student Award when she graduated in spring. The prize is designed to recognize graduating students who distinguished themselves from their peers through superior academic achievement, demonstrated leadership skills, exceptional motivation, works published and unyielding service to FIU's Engineering Department and the field of engineering.

Arias, who describes herself as "a motivated person and positive thinker," was the exemplary candidate. During her five years at FIU she was an Honors College student and was active in the student chapter of BMES, Tau Beta Pi, the Engineering Student Council and the Florida Engineering Society. She attended the Annual Biomedical Research Conference for Minority Students (ABRCMS) in 2003 and 2004 and jointly submitted an article that was published in the BMES *Bulletin*. As a Peer Mediator, she assisted students with conflict resolution. To stay physically active and disciplined, Arias joined the women's judo team.

While participating in the National Institute of Health's Minority Access to Research Careers (MARC) program for two years, she worked with Assistant Professor Anthony J. McGoron on in vitro blood-brain barrier models for antiepileptic drugs. The experience was instrumental in helping her land her first professional position.

BioHeart, Inc., hired the twenty-three-year-old from Nicaragua as a full-time Lab Technician after her graduation. She works in the research of cardiovascular cellular-based therapy. Although at BioHeart, Inc., for less than a year, she was recently promoted to Lab Technician II.

In her spare time, Arias is studying for the GRE in anticipation of applying for FIU's graduate program in Engineering Management. When not working or studying, she likes to go dancing, especially when the beat is a salsa or merengue. She also enjoys reading journals and the classics. Her favorite journal is *The Scientist*; her latest classic was Jane Austen's *Pride and Prejudice*.

Topics in Student Research

>> Professor Armando Barreto

>> Digital Signal Processing Laboratory

It takes years to see the outcome of one's hard work in biomedical engineering, but the results are worth the wait for Dr. Armando Barreto, Associate Professor and founder and Director of FIU's Digital Signal Processing Laboratory (DSP).

"Biomedical systems research is interesting because in studying the human body and analyzing the signals that it produces, one is interacting with the 'ultimate machine.' The results are bound to have a significant positive impact in people's quality of life and well-being, which is highly rewarding. I witnessed the profound gratitude that individuals with epilepsy showed to medical professionals who, using tools provided by biomedical engineers, helped turn their lives around with, for example, surgery that makes them 'seizure-free' after suffering frequent seizures for years."

Dr. Barreto began his research at FIU in 1987, not as a professor, but as a graduate student when he arrived with a BS in Electrical/Mechanical Engineering from the National Autonomous University of Mexico. Under the mentorship of Dr. Malcolm Heimer, he investigated variations of the Blood Volume Pulse with exercise and wrote and published his first technical paper in the U.S. to the X Annual International Conference of the IEEE Engineering in Medicine and Biology Society in 1988.

In 1989 he pursued a Ph.D. at the University of Florida, focusing on applying digital signal processing to biomedical signals. After graduation and one year of post-doctoral work with Dr. Jose Principe at the UF Brain Institute, he returned in 1994 to FIU to open the DSP lab and continue work on processing of signals of biomedical origin.

That work includes recording electromyogram (EMG) signals associated with the voluntary contraction of a group of facial muscles to allow a computer user with severe motion impairments, for example from the neck down, to drive the cursor of a computer.

Dr. Barreto watches movies in his spare time. "It's a great way to disconnect…[and] take a break from the ongoing concerns from work." He also enjoys listening to music, especially classic rock and pop, but also contemporary groups such as Oasis, Creed, Matchbox 20 and Counting Crows.

TOP ROW (STANDING, left to right): Miguel Alonso Jr., Dr. Armando Barreto, Craig Chin and Frederic Angus
BOTTOM ROW (SITED, left to right) Chao Li, Jing Zhai and Kenneth John Faller.

FACULTY FOCUS

>> Dr. Michael E. Brown

Dr. Michael E. Brown leads two lives. On the FIU campus, BME students know him as an Instructor. Off campus, to his colleagues and the bioscience industry, he is a senior scientist at Bioheart, Inc., in Weston.

Holding both an M.D. and Ph.D., he brings clinical and industry expertise to his classrooms. This dual role makes him a key asset to FIU's BME program, which strives to integrate academia, clinical medicine and the biomedical industry. Within this integration Dr. Brown foresees—and is excited about—the development of artificial organs as well as stem cell therapy and its potential to treat disease.

He began at FIU as a BME Courtesy Assistant Professor in September 2003 and was promoted to Instructor in December 2004. Currently, he teaches Engineering Analysis of Biological Systems I and II, Clinical Rotations for Biomedical Engineering, and Clinical Research Experience.

In January 2000, Dr. Brown joined Bioheart, where he has held positions as Chief Scientific Officer, Vice President of Clinical Affairs and Senior Scientist. Prior to Bioheart, he worked on projects with Genentech, Novo Nordisk, Janssen Research Foundation, Parke Davis and Bristol-Myers Squibb. Additionally, he collaborated and served as a coordinator, fellow, or research associate at the Joslin Center for Diabetes at Baptist Hospital in Miami, University of Miami, and Bascom Palmer Eye Institute. He also consulted with World Medical Manufacturing and Medtronic in F.D.A. I.D.E. clinical trials of implantable devices for the treatment of aortic aneurysms using endovascular therapy.

The Colorado native earned his bachelor's degree in biology at the University of Notre Dame, and then continued at the University of Miami to complete his doctorate in biochemistry and a medical degree at the University of Miami School of Medicine. He is a member of the Heart Failure Society, American Heart Association, and Regulatory Affairs Professionals Society.

When not working or teaching, Dr. Brown can be found on the water, scuba diving and fishing.