

# **College of Engineering and Computing**

## College of Engineering and Computing

Dean

**Amir Mirmiran**

*Interim Director, School of Computing  
and Information Sciences*

**Jainendra Navlakha**

*Associate Dean for Academic Affairs*

**TBA**

*Associate Dean for Research  
and Graduate Studies*

**Giri Narasimhan**

The College of Engineering and Computing is committed to educate professionals who can serve industry and the community at large in a wide variety of fields, as well as conduct innovative basic and applied research that meets the technical needs of industry and government, improves the quality of life, and contributes to the economic viability of Florida, the Nation, and the world.

The College of Engineering and Computing consists of one school, the School of Computing and Information Sciences, and five academic departments: Biomedical Engineering, Civil and Environmental Engineering, Construction Management, Electrical and Computer Engineering, and Mechanical and Materials Engineering. These academic departments offer programs leading to the Bachelor of Science, Master of Science and Doctor of Philosophy degrees.

The College has two institutes and thirteen centers supporting its academic and research programs. The institutes are the Advanced Materials Engineering Research Institute (AMERI) and the Telecommunications and Information Technology Institute (IT2). The centers are the Bioinformatics Research Group (BioRG), Center for Advanced Distributed Systems Engineering, Center for Advanced Technology and Education (CATE), Center for Diversity in Engineering and Computing (CDEC), Center for Emerging Technology for Advanced Information Processing and High-Confidence Systems, Center for the Study of Matter at Extreme Conditions (CeSMEC), Engineering Manufacturing Center (EMC), Eugenio Pino and Family Global Entrepreneurship Center, High Performance Database Research Center and the Lehman Center for Transportation Research (LCTR). Two major university centers, the Applied Research Center (ARC) and International Hurricane Research Center (IHRC), work very closely with the College of Engineering and Computing with many joint appointments at the faculty level.

The College has created an open-access Motorola Nanofabrication Research Facility to conduct research in nanoelectronics, bio/nanosensors and nanomaterials. In addition, the FIU College of Engineering and Computing has developed many collaborations with the industry and hospitals in Florida and across the nation.

The programs of the College are directed towards the practical use of scientific, engineering, and technical principles to meet the objectives of industry, business, government and the public.

The College provides each student with the opportunity to develop a high level of technical skills and to obtain an education, which will prepare him or her for a rewarding career and personal growth. Underlying the programs of the College is a recognition that the growing impact of technology upon the quality of life is increasing and that the proper application of technology is critical to meeting current and emerging human needs. The College faculty is

actively engaged with business, industry and government. Faculty members also participate in a variety of basic and applied research projects in areas such as energy, transportation, solid waste disposal, biotechnology, biomedical devices and instrumentation, computer engineering, artificial intelligence, manufacturing, robotics telecommunications, micro-electronics, nano-electronics, nanotechnology, neuro-sciences/engineering, modeling and simulation, construction engineering, materials, structural systems, virtual prototyping, systems modeling, information technology, environmental sciences and engineering, image processing, engineering education, etc.

### Doctor of Philosophy

The College offers Doctor of Philosophy degrees in Biomedical Engineering, Civil Engineering, Computer Science, Electrical Engineering, Mechanical Engineering, and Materials Science and Engineering.

Areas of study in Biomedical Engineering include:

- Biomechanics, Biomaterials, and Medical Devices
- Bioinstrumentation, and Biomedical Image/Signal Processing
- Drug Delivery and Tissue Engineering
- Medical Physics and Nuclear Medicine
- Bio-nanotechnology and Systems Biology

Areas of study in Civil Engineering include:

- Transportation Engineering
- Environmental Sciences and Engineering
- Structural Engineering
- Geotechnical Engineering
- Construction Engineering and Management

Areas of study in Computer Science include:

- Networking and distributed systems, wireless networks, mobile and ubiquitous computing, routers, and switches, system modeling.
- Operating systems, distributed computing, storage systems, virtualization, security, and real-time systems.
- Database systems, including distributed databases, information retrieval in heterogeneous databases, multimedia databases, data mining, and digital libraries.
- Software engineering, including formal methods, software testing techniques, software architecture, software security, software design, model-driven software development, and grid computing.
- Theory, including algorithms and data structures, programming languages, program verification, and logic.
- Bioinformatics and Computational Biology.
- Artificial Intelligence, including machine learning, expert systems, intelligent agents, affective computing, cognitive science, intelligent human-computer interaction, social informatics.

Areas of study in Electrical Engineering include:

- Biomedical Sciences and Engineering
- Micro-Electronics, Nano-Electronics and Photonics
- Computer Engineering
- Systems and Controls

- Electromagnetics and Nanomagnetism
- Power Systems
- Telecommunications and Networking
- Digital Signal and Image Processing

Areas of study in Mechanical and Materials Engineering include:

- Thermo/Fluids Sciences
- Biomedical Engineering
- Mechanics of Materials
- Nanostructured Materials
- Ceramics and Electronic Materials
- CAD/CAM
- Manufacturing
- Modeling and Simulation
- Nano Devices
- Applied Mechanics

## Master of Science Degree Programs

The College offers Master of Science degrees in:

- Biomedical Engineering
- Civil Engineering
- Computer Engineering
- Computer Science
- Construction Management
- Electrical Engineering
- Engineering Management
- Environmental Engineering
- Materials Science and Engineering
- Mechanical Engineering
- Telecommunications and Networking

## Corporate and Global Programs

In partnership with national and international corporations and universities, the College of Engineering and Computing offers several of its graduate programs off-campus. These programs are offered at the partner's site both in the USA and abroad, particularly Latin America, and the Caribbean.

Current Global Programs offered include MS in Engineering Management with specializations in Biomedical Technology, Information Systems, and Manufacturing, MS in Electrical Engineering, and BS in Computer Science. Negotiations are underway to offer MS in Construction Management, and MS in Telecommunications and Networking.

Students enrolled in these programs are considered regular FIU students; hence, they must meet university admission requirements and are given full access to the university's facilities.

## Distance Learning Education

Florida Engineering Education Delivery Systems (FEEDS) provides graduate engineering courses to place-bound professionals via CD, videotape, ITFS, and web-based asynchronous learning modules.

## Research Centers and Institutes

Research spans from single discipline to multidisciplinary research in the College of Engineering and Computing. Thus, the College, through its research centers and institutes, has established many collaborative and cooperative partnerships with other units in the university as well as with local industry.

The research units involved in these efforts include:

- Advanced Materials Engineering Research Institute (AMERI)
- Applied Research Center (ARC)
- Bioinformatics Research Group (BioRG)
- Center for Advanced Distributed Systems Engineering
- Center for Advanced Technology and Education (CATE)
- Center for Diversity in Engineering (CDE)
- Center for Emerging Technology for Advanced Information Processing and High-Confidence Systems
- Center for the Study of Matter at Extreme Conditions (CeSMEC)
- Distributed Multimedia Information Systems Laboratory
- Engineering Manufacturing Center (EMC)
- High Performance Database Research Center
- International Hurricane Research Center (IHRC)
- Lehman Center for Transportation Research (LCTR)
- Motorola NanoFabrication Research Facility
- Telecommunications and Information Technology Institute (IT2).

## Academic Support Services

The area of academic support services is responsible for the coordination of academic advising and student services the College of Engineering and Computing. Students are informed of educational opportunities such as scholarships, tuition waivers, and campus resources. It serves as a liaison between the academic departments and the student support services university wide and facilitates the registration process in order to make sure that the students adhere to the College guidelines.

## Admission Requirements

Prospective students seeking a graduate degree in the College must satisfy all university admission requirements as well as the specific program requirements. Each department evaluates candidates for admission to its programs. Prospective students should refer to the appropriate section of the catalog for specific admission requirements and for contact information of the Graduate Programs Directors.

<u>Biomedical Engineering:</u>	(305) 348-3019
Dr. Malek Adjouadi	
<u>Civil and Environmental Engineering:</u>	(305) 348-3837
Dr. Hector Fuentes	
<u>Construction Management:</u>	(305) 348-3172
Dr. Syed Ahmed	
<u>Electrical and Computer Engineering:</u>	(305) 348-3705
Dr. Frank Urban	
<u>Engineering Management:</u>	(305) 348-2256
Dr. Chin-Sheng Chen	
<u>Mechanical and Materials Engineering:</u>	(305) 348-2569
Dr. Cesar Levy	
<u>School of Computing and Information Sciences</u>	(305) 348-2036

Dr. Mark Allen Weiss  
Telecommunications and  
Networking: (305) 348-7567  
 Dr. Deng Pan

### Admitted Student Procedures

A student who has been accepted to a degree program in the College must meet with the Department's Graduate Program Director prior to the enrollment in the first class.

Enrolled students must choose an advisor during their first semester in the program.

Continued contact (at least once per semester) with the advisor is required to review progress and select courses for each succeeding semester.

Courses taken without the required prerequisites and co-requisites, or without the consent of the advisor, will be dropped automatically before the end of the term, resulting in a grade of "DR" or "DF".

Scientific Laboratory Fees are assessed for certain courses where laboratory classes are part of the curriculum. Specific information on scientific laboratory fees may be obtained from the University Financial Services.

### Fellowships, Assistantships, and Scholarships

The College of Engineering and Computing offers a variety of fellowships, assistantships, and scholarships to qualified students. These awards are highly competitive; hence, prospective students are urged to apply and submit all required records and scores as early as possible so they can be considered for these awards.

The amounts of these awards vary depending on the type of the award, but they may provide full tuition and a monthly stipend. Visit: [www.eng.fiu.edu](http://www.eng.fiu.edu) for additional information.

### Policies, Requirements, and Regulations

The University, the University Graduate School, and the College of Engineering and Computing have a set of guidelines to protect the student's rights and to ensure a timely graduation. Students must become familiar with all University, the University Graduate School, and College's graduate procedures. These procedures are described in the University's Student Handbook, this catalog and at <http://gradschool.fiu.edu>.

The programs, policies, requirements and regulations listed in the catalog are continually subject to review to serve the needs of the University's various publics, and to respond to the mandates of the FIU Board of Trustees and the Florida Legislature. Changes may be made without advance notice.

Florida International University and the College adhere to opportunity practices, which conform to all laws against discrimination and are committed to non-discrimination with respect to race, color, creed, age, handicap, sex, marital status, or nationality. Additionally, the University is committed to the principle of taking positive steps necessary to achieve the equalization of educational and employment opportunities.

### College of Engineering and Computing Dismissal Policy

A student who has been dismissed from the University for the first time may see the Graduate Program Director to begin the appeal procedure. The Director will determine if

the student is eligible to appeal the dismissal or if there is a way to lift the dismissal. If the student is eligible, he or she must make an appointment to see the chairperson or associate chairperson. The student must bring a letter stating when he or she was dismissed the first time and what he or she is going to do to ensure that he or she is not dismissed a second time. If the chairperson determines that the student is worthy of reinstatement, he or she will prepare and sign a memo for the College Dean's consideration stating the conditions for the student to be reinstated. The student may be readmitted on academic probation upon the approval of the Dean of the University Graduate School. If the student does not meet these conditions, he or she will be dismissed a second and final time from the program. The student must also sign an agreement stating that he or she understands that the department will not allow a second reinstatement if the student is dismissed again.

Any student who is dismissed a second time from FIU will not be readmitted under any circumstances. Only a first dismissal appeal is considered in the College of Engineering and Computing, a second dismissal appeal will not be accepted.

### Department-Specific Information

For additional information refer to your selected department in this catalog, or call the graduate program director of each department. As listed above.

### Other Important Contact Information

Website: <http://www.eng.fiu.edu>

Admissions:	
<a href="http://gradschool.fiu.edu">http://gradschool.fiu.edu</a>	(305) 348-7442
College of Engineering and Computing- Graduate Admissions	(305) 348-3526
Campus Resources	(305) 348-2973
Career Services	(305) 348-1281
Financial Aid	(305) 348-2489
University Graduate School	(305) 348-2455
International Students and Scholars Services	(305) 348-2421
Registrar's Office	(305) 348-2320
Scholarships	(305) 348-3526
Tuition Waivers	(305) 348-3526

## Engineering Management

**Chin-Sheng Chen**, *Professor and Program Director*  
**Ronald Giachetti**, *Associate Professor*  
**Shih-Ming Lee**, *Associate Professor*

### Master of Science in Engineering Management

*The Master of Science in Engineering Management (MSEM) program develops future leaders of business and industry in an engineering and technological environment. The program blends a carefully chosen mix of graduate courses offered by the College of Engineering and Computing, the College of Business Administration, and the College of Law. The MSEM program is designed to offer a tailored degree for those engineers who would like to advance to managerial positions and wish to acquire the necessary knowledge and skills for success. The*

MSEM program includes coursework that simulates a business environment where students learn and apply engineering tools, managerial theories, and best practices to design and operate industrial systems. Students in the program are expected to acquire contemporary engineering management theories and techniques, and simultaneously build a solid technical foundation in a chosen engineering track.

### Admission Policies

The applicant to the MSEM program must have a bachelor's degree in engineering or a closely related field from a regionally accredited institution with a minimum of "B" average in upper-level undergraduate work, or a graduate degree from an accredited institution. In addition, international graduate student applicants whose native language is not English are required to submit a score for the Test of English as a Foreign Language (TOEFL) or for the International English Language Testing System (IELTS). A total score of 80 on the iBT TOEFL or 6.5 overall on the IELTS is required. The applicant whose GPA does not meet the minimum GPA requirement may be considered for conditional admission. For such consideration, the applicant must submit (1) three letters of recommendation; (2) a resume including education, training, and employment history, practical and research experience (such as projects and publications), skills and other pertinent information; and (3) a statement of objective in which the applicant must clearly state his/her intended engineering track, in addition to other information.

### Degree Requirements

The MSEM program requires 30 credit hours of course work including 9 credit hours of engineering management core courses, 9 credit hours of business electives and 12 credit hours of approved graduate-level electives from an engineering track.

### Engineering Management Core Courses

Students in the Engineering Management program are required to take three courses (9 credit hours) to build an engineering management foundation that includes topics in engineering quality management, systems improvement, engineering project management, intellectual property issues, and business laws. The three core courses are:

EIN 5226	Total Quality Management For Engineers	3
ESI 6455	Advanced Engineering Project Management	3
LAW 5072	Business Law and Intellectual Property for Engineers and Entrepreneurs	3

### Business Electives

Students in the program are required to take three courses (9 credit hours) to gain fundamental knowledge about management functions that includes topics in accounting, finance, organizational behavior, leadership, marketing, and operations management. The suggested list of courses is given below:

ACG 6026	Accounting for Managers	3
FIN 6428	Corporate Finance	3
MAN 6209	Organization Design and Behavior	3
MAR 6805	Marketing Management	3

MAN 6830	Organization Information Systems	3
MAN 6501	Operations Management	3
EIN 5359	Industrial Financial Decisions	3
MAN 6167	Leadership in a Global Environment	3

### Engineering Tracks

Students in the Engineering Management program must choose an engineering track from any academic unit in the College of Engineering and Computing. Within a chosen track, students are required to take four courses (12 credit hours) that meet the program's technical requirement. These engineering electives are designed to broaden and deepen the students' understanding of engineering and technology development in a chosen track. Students should have a proper educational background in order to take elective courses. Additional tracks and elective courses may be available, subject to the approval of the Engineering Management program director.

### Biomedical Engineering Track

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

BME 5005	Applied Biomedical Engineering Principles	3
BME 5036	Biotransport Processes	3
BME 5105	Intermediate Biomaterials Science	3
BME 5316	Molecular Bioprocess Engineering	3
BME 5340	Introduction to Cardiovascular Engineering	3
BME 5560	Biomedical Engineering Optics	3
BME 5573	Nanomedicine	3
BME 6505C	Engineering Foundations of Medical Imaging Instrument	3

### Computer Engineering Track

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

EEL 5718	Computer Communication Network Engineering	3
EEL 5725	Digital Systems Engineering	3
EEL 5757	Real-Time DSP Implementations	3
EEL 6167	VLSI Design	3
EEL 6253	Computer Analysis of Power Systems	3
EEL 6505	Digital Signal Processing	3
EEL 6575	Data Communications Engineering	3
EEL 6681	Fuzzy System Design	3

### Computer Science Track

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

CEN 5011	Software Engineering	3
COP 5725	Principles of Database Management Systems	3
COP 5614	Operating Systems	3
COT 5420	Theory of Computation I	3
COT 5607	Introduction to Algorithms	3

### Construction Management Track

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

BCN 5315	Productivity in Construction	3
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BCN 5626	Construction Cost Analysis & Control	3
BCN 5645	Construction Economic Analysis	3
BCN 5728	Principles of Construction Scheduling	3
BCN 5774	Topics in International Construction	3
BCN 6775	Decision & Risk Analysis in Construction	3
BCN 6916	Development in Construction Technology	3
CCE 5505	Computer Integrated Construction	3

### Electrical Engineering Track

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

EEL 5090	Introduction to Nanotechnology	3
EEL 5171	Advanced Systems Theory	3
EEL 5500	Digital Communication Systems I	3
EEL 5501	Digital Communication Systems II	3
EEL 6219	Electric Power Quality	3
EEL 6261	Power Systems Engineering	3
EEL 6443	Electro-Optical Devices and Systems	3
EEL 6505	Digital Signal Processing	3

### Enterprise Systems Track

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

EGN 5620	Enterprise Systems Configuration	3
EGN 5621	Enterprise Systems Collaboration	3
EGN 5622	Enterprise Systems Integration	3
EGN 5623	Enterprise Systems Optimization	3
EIN 5346	Logistics Engineering	3
EIN 6133	Enterprise Engineering	3

### Engineering Entrepreneurship Track

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

EIN 6105	Technology Policies and Strategies	3
EIN 6160	Management of Innovation and Technology	3
EIN 6324	Technology Entrepreneurship	3
EIN 6392	Product Design and Development	3

### Environmental Engineering Track

Students in this track are required to take four courses from the following list with the approval of the Graduate Program Director and after meeting prerequisite requirements. Additional courses may be selected with approval of the program director.

ENV 5406	Water Treatment Systems and Design	3
ENV 5517	Design of Wastewater Treatment Plants	3
ENV 5666	Water Quality Management	3
CWR 5235	Open Channel Hydraulics	3
CWR 6125	Groundwater Hydrology	3
ENV 5104	Indoor Air Quality	3
ENV 5105	Air Quality Management	3
ENV 5347	Waste Incineration	3
ENV 5126	Particulate Air Pollution Control	3
ENV 5127	Gaseous Air Pollution Control	3
ENV 5356	Solid and Hazardous Waste	3
ENV 5027	Biomediation Processes	3
ENV 5335	Advanced Hazardous Waste Treatment Processes	3
ENV 5008	Appropriate Technologies for Developing Countries	3
ENV5007	Environmental Planning	3

ENV 5519	Chemistry for Environmental Engineers	3
ENV 6045	Environmental Modeling	3
ENV 6070	Green Engineering	3
ENV 6614	Environmental Impact Assessment	3

### Information Technology Track

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

CIS 5027	Computer Systems Fundamentals	3
CIS 5372	Information Assurance	3
COP 5716	Software and Data Modeling	3
COP 5725	Principles of Database Management Systems	3
TCN 5030	Computer Communications and Networking Technology	3

### Mechanical Engineering Track

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

EGM 5346	Computational Engineering Analysis	3
EGM 5354	Finite Element Methods Application in ME	3
EGM 5615	Synthesis of Engineering Mechanics	3
EGM 6422	Advanced Computational Engineering Analysis	3
EML 5103	Intermediate Thermodynamics	3
EML 5152	Intermediate Heat Transfer	3
EML 5505	Smart Machine Design and Development	3
EML 5509	Mechanical Design Optimization	3
EML 5530	Intermediate CAD/CAE	3
EML 5606	Advanced Refrigeration and AC Systems	3
EML 5709	Intermediate Fluid Mechanics	3
EML 5725	Computational Fluid Dynamics	3

### Risk and Disaster Management Track

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

BCN 5588	Vulnerability Analysis	3
BCN 5589	Hazard Mitigation	3
ENV 6614	Environmental Risk Assessment	3
PHC 6251	Disaster and Emergency Epidemiology	3
MAN 6706	Crisis Management	3
MAP 6630	Numerical Analysis in Risk Analysis and Management	3
MAP 6635	Risk Analysis and Management I	3
MAP 6636	Risk Analysis and Management II	3

### Structural/Wind/Construction Track

Students in this track are required to take four courses from the following four groups (one per group) with the approval of the Graduate Program Director and after meeting prerequisite requirements. Additional courses may be selected with approval of the program director.

#### Group 1

CCE 5035	Construction Engineering Management	3
CCE 5036	Advanced Project Planning for Civil Engineers	3

#### Group 2

CES 5106	Advanced Structural Analysis	3
EGM 5421	Structural Dynamics	3

**Group 3**

CES 5715	Prestressed Concrete Design	3
CES 5606	Advanced Structural Steel Design	3
CES 6706	Advanced Reinforced Concrete Design	3
EGN 5439	Design of Tall Buildings	3

**Group 4**

CEG 5065	Geotechnical Dynamics	3
CEG 6105	Advanced Foundations Engineering	3

**Systems Engineering Track**

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

EIN 5332	Quality Engineering	3
EIN 5346	Logistics Engineering	3
EIN 6105	Advanced Industrial Information Systems	3
EIN 6133	Enterprise Engineering	3
EIN 6336	Advanced Production Planning and Control	3
EIN 6345	Inventory Control Systems	3
EIN 6357	Advanced Engineering Economy	3
EIN 6940	Industrial and Systems Engineering Internship	3
ESI 5522	Simulation Models of Engineering Systems	3
ESI 5602	Engineering Data Representation and Modeling	3
ESI 5603	Advanced Software Tools	3
ESI 6316	Applications of OR in Manufacturing	3
ESI 6470	Stochastic Optimization	3

**Telecommunications Track**

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

TCN 5010	Telecommunications Technology and Applications	3
TCN 5030	Computer Communications and Networking Technologies	3
TCN 5060	Telecommunications Software and Methodologies	3
TCN 5640	Telecommunications Enterprise Planning and Strategy	3
TCN 6210	Telecommunications Network Analysis and Design	3
TCN 6430	Network Management and Control Standards	3
TCN 6450	Wireless Information Systems	3
TCN 6880	Telecommunications Public Policy Development and Standards	3

**Transportation Engineering Track**

Students in this track are required to take four courses from the following list. Additional courses may be selected with approval of the program director.

TTE 5205	Advanced Highway Capacity Analysis	3
TTE 5215	Fundamentals of Traffic Engineering	3
TTE 5607	Transportation Demand Analysis	3
TTE 5805	Advanced Geometric Design of Highways	3
TTE 6257	Traffic Control Systems Design	3
TTE 6506	Mass Transit Planning	3
CGN 5320	GIS Applications in Civil and Environmental Engineering	3

**Water Resources Engineering Track**

Students in this track are required to take four courses from the following list with the approval of the Graduate Program Director and after meeting prerequisite requirements. Additional courses may be selected with approval of the program director.

CWR 5140C	Ecohydrology	3
CWR 5235	Open Channel Hydraulics	3
CWR 5251	Environmental Hydraulics	3
CWR 5535C	Advanced Modeling Applications in Water Resources Engineering	3
CWR 6117	Statistical Hydrology	3
CWR 6125	Groundwater Hydrology	3
CWR 6126	Advanced Groundwater Hydrology	3
CWR 6236	Engineering Sediment Transport	3
ENV 5666	Water Quality Management	3

**Master's Project Option**

Students in the Engineering Management graduate program may receive permission to conduct a master's project of three credit hours within their chosen track to complete the degree program. The master's project (EIN 6950) will replace one graduate elective course.

**Grades and Credits**

Students are required to maintain a GPA of 3.0. Courses with a grade below 'C' will not be counted toward the Master of Science degree in Engineering Management.

**Transfer Credit**

Students may receive permission to transfer up to a maximum of six semester credits provided that: (1) the courses were taken at the graduate level at an accredited college or university; (2) with a grade of 'B' or better; (3) the courses were judged relevant by the program director; (4) the credits were not used toward another degree; and (5) the credits will be no older than six years at the time of graduation. No more than 12 semester hours taken at FIU as a non-degree seeking student may be counted toward the Engineering Management graduate program.

**Time Limit**

All works applicable to the Master of Science degree in Engineering Management, including transfer credits, must be completed within six years of conferral of the degree.

**Course Descriptions****Description of Prefixes**

EGN-Engineering, General EIN-Engineering, Industrial; ESI-Engineering Systems Industrial  
F-Fall semester offering; S-Spring semester offering; SS-Summer semester offering.

**EGN 5620 Enterprise Systems Configuration (3).** Enterprise systems overview; major enterprise functions; standard operation procedures; system configuration and parameters; master data; user interfaces and reports; and hands-on experience. Prerequisite: Permission of the instructor.

**EGN 5621 Enterprise Systems Collaboration (3).** Collaborative engineering and environment; decision processes; changes management; virtual enterprise operation systems; and hands-on experience with a

commercial enterprise operation system. Prerequisite: EGN 5622.

**EGN 5622 Enterprise Systems Integration (3).** Enterprise architectures; work flow modeling and design; systems integration methodology; vertical and horizontal integration; master data analysis and integration; and hands-on experience. Prerequisite: EGN 5520.

**EGN 5623 Enterprise Systems Optimization (3).** Supply networks overview; interactive supply network planning; optimal systems and process design; optimization techniques and heuristics; master and transaction data transfer; and hands-on experience. Prerequisite: EGN 5622.

**EIN 5106 Regulatory Aspects of Engineering (3).** A survey of the legal and regulatory requirements encountered by engineers. Included will be OSH Act, NIOSH, ADA, EEOC, Worker's Compensation and Product Liability.

**EIN 5226 Total Quality Management for Engineers (3).** Fundamentals of TQM and its historical development. Integration of QC and management tools, QFD, benchmarking, experimental design for scientific management. (F,S)

**EIN 5322 Engineering Management (3).** Organization of engineering systems including production and service organizations. Inputs of human skills, capital, technology, and managerial activities to produce useful products and services. (F,S)

**EIN 5332 Quality Engineering (3).** This course examines quality control from an engineering standpoint. It covers ways to meet the challenge of designing high-quality products and processes at low cost. Prerequisites: EIN 3331 or equivalent. (S)

**EIN 5346 Logistics Engineering (3).** Concepts and tools for effective design and management of supply chain systems. Includes logistics strategies, inventory management, customer service, supply chain integration and logistics network design. Prerequisite: Permission of the instructor.

**EIN 5359 Industrial Financial Decisions (3).** The use of financial techniques and data in planning, controlling and coordinating industrial activities. This course will familiarize the student with accounting concepts and analytical methods. Prerequisite: EIN 3354. (SS)

**EIN 6105 Technology Policies and Strategies (3).** Strategies and policies for managing all aspects of technology. Includes value chain integration, intellectual property, and internal processes and systems.

**EIN 6117 Advanced Industrial Information Systems (3).** Review of the fundamental and theoretical foundation of industrial information systems. Application of the system design process and information system concepts to develop integrated engineering systems. (F,S)

**EIN 6133 Enterprise Engineering (3).** Enterprise processes and functions, enterprise engineering methodology and techniques, enterprise scalability, systems and vertical integration, systems design and implementation. Prerequisite: Permission of Instructor.

**EIN 6160 Management of Innovation and Technology (3).** The course provides an integrated view of

management of technology. The combination of theory and practice addresses the challenges of globalization, time compression, and technology integration. Prerequisite: Permission of instructor.

**EIN 6324 Technology Entrepreneurship (3).** Entrepreneurial process, evaluation of technology, startup operations and strategy, business plans and venture capital, intellectual property and rights, growth and technology management.

**EIN 6336C Advanced Production Planning and Control (3).** Analytical and algorithmic planning methodologies, planning and scheduling technologies, sequencing rules, control strategies, and line balancing methods. Prerequisite: EIN 4334.

**EIN 6345 Inventory Control Systems (3).** Design of non-traditional inventory control systems. Development of several inventory system models. Exploration of methods of collecting appropriate demand and cost data for effective systems analysis. Prerequisite: ESI 3314.

**EIN 6357 Advanced Engineering Economy (3).** Review of engineering economy and the evaluation of advanced manufacturing systems. Evaluation of alternative capital investments considering income taxes, depreciation, inflation, risk and uncertainty. Prerequisite: EIN 3354. (SS)

**EIN 6392 Product Design for Manufacturability and Automation (3).** Overview and integration of the design-material-manufacture process. Design considerations for manufacturability, assembly, and economical production. Concurrent engineering systems. Prerequisite: EIN 4395. (S)

**EIN 6940 Industrial and Systems Engineering Internship (1-3).** To provide graduate students with work experience under approved industrial supervision. Prerequisite: Permission of department chairperson.

**EIN 6950 Engineering Management Masters Project (1-3).** Individual work culminating in a professional practice-oriented report suitable for the requirements of the Master of Science in Engineering Management program. Prerequisite: Permission for the advisor.

**ESI 5522 Simulation Models of Engineering Systems (3).** Simulation Methodology; design and implementation of models of engineering systems using computer software; case studies. Prerequisite: STA 3033 or EIN 3235 or equivalent and COP 3175 or equivalent.

**ESI 5602 Engineering Data Representation and Modeling (3).** The course will cover the life cycle of designing, developing, and implementing engineering database systems by applying the IDEFx methodology. Prerequisite: Permission of Instructor.

**ESI 5603 Advanced Software Tools for ISE (3).** Algorithms and principles to integrate heterogeneous tools. Principles of XML, ASP, and other tools. Development of programming projects.

**ESI 6316 Applications of OR in Manufacturing (3).** Overview of OR techniques. Manufacturing system and product selection. Shop loading, resource allocation, production scheduling, job sequencing, and plant layout problems. System performance evaluation. Prerequisite: ESI 3314. (F)



**ESI 6455 Advanced Engineering Project Management (3).** This course covers entire phases of project management including selection, planning, budgeting, scheduling, monitoring, and control. It focuses on the management of engineering projects through case studies and independent research assignment. Prerequisite: Permission of the instructor. (S,SS)

**ESI 6470 Stochastic Optimization (3).** Formulating and solving decision-making models with uncertain data. Exact and approximation techniques for large-scale stochastic models. Prerequisite: ESI 6316.

## Research, Development and Training Centers

### Advanced Materials Engineering Research Institute (AMERI)

**W. Kinzy Jones**, *Director and Professor, Mechanical and Materials Engineering*

The Advanced Materials Engineering Research Institute provides an open access equipment infrastructure to support materials research and engineering over a broad range of technology and capabilities. The Institute provides analytical instrumentation, materials characterization, and process development laboratories to support faculty and industry in the development and characterization of new materials over the continuum from the nanoscale to bulk materials.

The Analytical Instrumentation Laboratory contains two field emission scanning electron microscope (FESEM), a 200 keV Transmission Electron Microscope (TEM), Atomic Force Microscope (AFM), X-ray diffraction, thermal (DSC, TGA, DMA, dilatometer flush diffusion, and mechanical testing (uniaxial/biaxial Instron). Process Development laboratories for ceramic processing (sol-gel, tape casting, milling), and thermal processing (air, vacuum, hydrogen, controlled atmosphere furnaces) are available to support faculty and student researchers.

The Institute consists of the Motorola Nanofabrication Facility which is supported by a class 100 clean room and nanofabrication capabilities including e-beam lithography and optical photolithography. Fabrication of nano/micro electromechanical systems (N/MEMS) can be accomplished by a combination of nanolithography, focused ion beam (FIB) micro machining, nano imprinting, reactive ion etching, and thin film deposition by a variety of techniques (e-beam, sputtering, filament evaporation, cvd).

In addition to supporting research within the graduate program in materials science within the Department of Mechanical and Materials Engineering, the Institute supports faculty across all departments (physics, chemistry, geology, biology, electrical and computer engineering and biomedical engineering) in materials based research.

#### Research and Support Staff

**W. Kinzy Jones**, *Director and Professor, Mechanical and Materials Engineering*

**Arvind Agarwal**, *Associate Professor, Mechanical and Materials Engineering*

**Jiuhua Chen**, *Associate Professor, Mechanical and Materials Engineering*

**Wonbong Choi**, *Associate Professor, Mechanical and Materials Engineering*

**Chenzhong Li**, *Assistant Professor, Biomedical Engineering*

**Wenzhi Li**, *Assistant Professor, Physics*

**Norman Munroe**, *Associate Professor, Mechanical and Materials Engineering*

**Roberto Panepucci**, *Assistant Professor, Electrical and Computer Engineering*

**Surendra Saxena**, *Professor, Mechanical and Materials Engineering*

**Yuriy Vlasov**, *Research Engineer*

**Chunlei (Peggy) Wang**, *Associate Professor, Mechanical and Materials Engineering*

**Kuang-Hsi Wu**, *Professor, Mechanical and Materials Engineering*

**Yesim Darici**, *Associate Professor, Physics*

**Watson Lees**, *Associate Professor, Chemistry*

**Kevin O'Shea**, *Professor, Chemistry*

**Yanqing Liu**, *Research Engineer*

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### Applied Research Center (ARC)

**John R. Proni, Ph.D.** *Executive Director*

**David Roelant, Ph.D.** *Associate Director of Research for Environment & Water*

**George Philippidis, Ph.D.** *Associate Director of Research for Energy*

**Jerry Miller**, *Associate Director of Security, Policy and Technologies*

**Richard Burton, PMP** *Associate Director of Business Programs*

**Gloria Dingeldein**, *Associate Director of Grants*

**Leonel Lagos, Ph.D., PMP** *Director of Diversity and Workforce Development & Training*

ARC's **mission** is to solve complex issues in environmental stewardship, energy, and defense through innovative, cooperative research and entrepreneurship. In carrying out this mission, the Applied Research Center is committed to providing training opportunities to the University's uniquely diverse student body under the mentorship of the Center's experienced engineers and scientists.

ARC's **vision** is to be a leading university-based, applied research institution that provides real-world solutions throughout the Americas and globally that will enable Florida International University to become a leading research institution with well funded programs.

**Environment & Water** – ARC provides a full spectrum applied environmental and water research. With over 260 projects and \$90M of funding in this area since the Center's founding in 1995, ARC is a nationally recognized leader. Examples of **science research** include: development and testing of remediation technologies to stabilize toxic metal contaminants in soils; new analytical methods for perchlorate measurements in fish tissue; and the modeling of the energy-dependent, absorption and transmission of infrared light through human tissues for safety standards and for new medical imaging technologies. In **technology development** ARC has developed patents and other intellectual property such as: automated monitoring systems for sampling ground and surface water as well as abandoned buildings contaminated with radioactivity; novel new sensors for

contaminants in soils and groundwater (e.g., Hg and U); improved scabbling systems for removing surface contamination from floors, walls and large bore piping; sensor systems for UGVs and UAVs; and much more. ARC is the one of only three major environmental **technology test and evaluation** centers in the U.S. ARC has tested over 250 new, commercial technologies in order to assess and improve their effectiveness prior to deployment across the country. Several States including Texas have implemented ARC's rigorous environmental technology testing methodology. ARC is a leading university research program in **waste management** and pollution prevention, with \$1-2M per year of funding and has certification in hazardous waste management. ARC currently assists DOE in the cleanup of the Nuclear Weapons Complex by developing technologies to remediate contaminated soil and groundwater plumes; technologies to clean and dismantle contaminated nuclear facilities; and those to characterize, retrieve and treat radioactive and mixed wastes. **Water research** focuses on advanced groundwater and surface water modeling for clients worldwide including contaminated sites across the U.S. such as the Everglades. 1000 students to date have had "hands on" research mentoring and training at ARC in the water and environmental area. In collaboration with ARC's Security, Policy and Technologies scientists ARC has supported the U.S. Army by developing, fabricating and demonstrating several environmental technologies across Latin America (e.g., wetlands design and construction, mobile water purification systems). More on ARC's Environmental and Water research can be found at [www.arc.fiu.edu/environment&water](http://www.arc.fiu.edu/environment&water).

**Renewable Energy and Biofuels** – The country's over-dependence on imported oil and increasing concern about global warming necessitate the development of domestic renewable energy and fuel sources and the adoption of energy efficiency and conservation steps. In light of the country's urgent need for enhanced energy security and reduced greenhouse gas emissions, ARC is developing technologies covering the full spectrum of sustainable energy resources from solar and wind to biomass, biofuels, and fuel cell systems. Capitalizing on the national emphasis on clean and renewable energy, ARC has enhanced its research and technology development activities in various energy fields and has created an affiliate center, the Center for Energy and Technology of the Americas (CETA) to promote energy integration and technology transfer within the Western Hemisphere. ARC is developing technologies for production of sustainable biofuels: (1) Ethanol from cellulosic biomass, such as sugarcane bagasse and wood waste, using biochemical and thermochemical processes, and (2) Biodiesel from non-edible oils (jatropha) and from native algae. In the areas of hydrogen and fuels cells, ARC investigates the production of hydrogen from biomass via gasification and biologically by microorganisms, while looking for ways to manufacture cost-competitive high temperature PEM fuel cells. ARC possesses pilot-scale facilities for biomass gasification and biodiesel production, which serve the needs of the public and private sectors for testing and demonstrating new technologies. Moreover, in collaboration with FIU's Business School, the ARC has formed the Energy Business Forum (EBF), which promotes the development on new energy markets and their integration into the existing fossil energy infrastructure. The EBF has been organizing stakeholder

conferences to facilitate dialogue, exchange of ideas and partnerships.

**Security, Policy and Technologies** – ARC conducts advanced research in security policy; renewable energy technologies and other security/defense technologies. ARC's scientist and engineers conduct a variety of research work applicable for the DOD, DHS and other private entities involved in security and defense issues. ARC's researchers have linguistic and cultural skills needed to implement solutions in the field. Our mission is to solve international problems in the field through integration of technology and policy development in three areas—Applied Technologies, Security and Stability Studies, and Security Technologies.

**Applied Technologies** focuses on researching, demonstrating, validating and implementing renewable energy and environmental technologies in the field in order to develop sustainable solutions in the following areas: 1) Rural electrification, 2) Biomass gasification for thermal and electrical energy production, 3) Constructed wetlands as a treatment for waste water, 4) Solar-power and solar-powered water purification systems, 5) Micro-hydro electric generation, 6) Bio-fuels production and use ("field to fuel") and 7) International Waste-to-Energy solutions.

**Security and Stability Studies** addresses security and policy research throughout Latin America and the Caribbean. Using a "network of experts approach", a multidisciplinary group of collaborative experts from more than 30 universities throughout the hemisphere, focus on emerging security threats throughout the world. ARC sponsors colloquia, conferences and research on stability and security issues, and delivers analytical reports that combine economic, geopolitical, social and scientific analysis, as well as recommendations to our clients.

**Security Technologies** (formerly Defense Technologies) is an expanding area of research that includes research in development and implementation of security technologies in the fields of acoustic systems, sensor systems, mobile platform robotics, artificial intelligence and information technology, detection systems, advanced power systems for remote sensors and development/applications of UAVs. During the past three years, the Center has conducted research on twelve projects with an overall value of more than \$4M. Clients such as AFOSR, AFRL, ARO, MDA, DARPA, and NRO have partnered with ARC on research, which includes: integration of sensors and imaging systems into autonomous monitoring technologies, such as remote ground stations and unmanned aerial vehicles (UAVs) and unmanned ground vehicles (UGVs); Computational Fluid Dynamics analyses and experimental research for micro-channel nozzle flow for space vehicle thrusters, hypersonic flow for Scramjets, model verification of ice formation on wings, and micro-channel cooling of electronic components; and numerical simulation of micro-bubble drag reduction for applications in naval ships and submarines.

**Workforce Development and Training** – The DOE-FIU Science and Technology **Workforce Development** program is an innovative program to create a "pipeline" of FIU STEM (science, technology, engineering, and math) underrepresented students specifically trained and mentored to enter the DOE workforce in technical areas of need. The main objective of the program is to provide a unique integration of FIU course work, DOE field work, and "hands on" training and mentoring at ARC. It is envisioned that once our DOE Fellows graduate from this

program they will enter DOE-EM's Professional Development Corps Program and/or work for DOE's contractor firms. To date, a total of 33 FIU underrepresented students have joined the program. The students are officially inducted into the program and vested the name of **DOE Fellows** in a special Induction Ceremony celebrated during the Fall semester. DOE Fellows also have internship opportunities at DOE National Laboratories and DOE sites around the country. Since the program's initiation in 2007, a total of 14 DOE Fellows have participated in research internships at Oak Ridge National Laboratory, Idaho National Laboratory, Pacific Northwest National Laboratory, and DOE-HQ in Washington DC. In addition, our DOE Fellows directly support DOE contractors performing environmental remediation around the DOE Complex. Furthermore, this program enables undergraduate students to pursue the M.S. and Ph.D. degrees by providing Research Assistantships. So far, a total of 10 DOE Fellows have obtained B.S. degrees and have transitioned to M.S. programs at FIU.

ARC is committed to the education and development of FIU students and has developed a Student Steering Committee (SSC) that oversees the academic and research progress of each student. This committee also conducts interviews and evaluates applicants for the program. ARC is working closely with federal, state agencies, community colleges and other universities to provide training in alternative energy areas such as: solar, biomass, nuclear and weathering. This Energy Systems Training Network under the Florida Energy Systems Consortium (FESC) will help to develop a 21st century "green workforce".

#### **Doing Business with the Applied Research Center –**

ARC's employees are drawn from a wide segment of the commercial, government, and academic arenas to collectively utilize their experience and expertise to support the needs of FIU's clients. Our operating philosophy recognizes and accommodates the critical performance characteristics of government and commercial activities, while exercising the benefit of its cost structure in a way that serves both client interests and those of the University and its students. Our staff is fully engaged in the project and program activities assigned. The critical difference in the ARC's structure is the project management and administrative processes and structures that have been put in place to serve its clients. The Center has executed work for federal agencies, state and local governments, and commercial entities, in large part through task-based contracts. For instance, in working with the U.S. Department of Defense, the Center has acted as both the prime contractor and as a sub-contractor/consultant for commercial partners, serving to streamline the process. For more information on FIU's ARC, please visit [www.arc.fiu.edu](http://www.arc.fiu.edu) or email us at [arc@arc.fiu.edu](mailto:arc@arc.fiu.edu) or call (305) 348-4238.

### **Bioinformatics Research Center (BioRG)**

**Giri Narasimhan**, *Director and Professor, School of Computing and Information Sciences*

The mission of this research group is to work on problems from the fields of Bioinformatics and Biotechnology. The group's research projects includes Pattern Discovery in sequences and structures, micro-array data analysis,

primer design, probe design, phylogenetic analysis, image processing, image analysis, and more. The group builds on tools and techniques from Algorithms, Data Mining, Computational Statistics, Neural Networks, and Image Processing.

### **Center for Advanced Distributed Systems Engineering**

**Xudong He**, *Director and Professor, School of Computing and Information Sciences*

Another of our research efforts is the Center for Advanced Distributed System Engineering (CADSE). Its mission is to establish a streamlined research, technology exploration and advanced training program in the field of distributed and Internet-based computing. The Center's R&D cover both theoretical and practical aspects of distributed software engineering, i.e. using engineering methods and technologies to tackle development problems of complex, reliable, and/or real-time distributed systems.

### **Center for Advanced Technology and Education (CATE)**

**Malek Adjouadi**, *Director and Associate Professor, Joint Appointment with Biomedical Engineering and Electrical and Computer Engineering*

The vision of the NSF-CATE center at FIU is to foster a cross-disciplinary research and educational program as a catalyst for our undergraduates and graduates alike to develop their creative thinking by bringing in synergy the fields of applied information (signal and image) processing, neuroscience and assistive technology research. The CATE center focuses on new methodologies that (1) will enhance analysis and interpretation of signals and images in real-world applications; (2) will meet the impending needs in neuroscience as we elicit both the functional mapping of the brain, and the causality of key brain disorders; and (3) will result in new Human-Computer Interface (HCI) prototypes that address effectively the issue of *Universal Accessibility*, focusing on visual impairment and motor disability. Experimental results, as observed through clinical means or through system design evaluations and feasibility studies serve as means to redefine or re-evaluate our theoretical premises. The strong collaboration we have secured with our industry partners generates joint programs, student internships, clinical rotations, joint faculty appointments, shared use of modern equipment and infrastructure. The overall mission of the CATE Center is thus to create a unified infrastructure to synergize imaging/signal processing research, while fostering an environment that supports cross-disciplinary initiatives in order to produce new scientific specialties relying on combinations of specific technologies, medicine, and computation. This environment as set is apt to ensure the anticipated success in meeting our students' educational needs and research goals all the way to the Ph.D. level.

#### **Research Areas**

- Image and Signal Processing and Computer Vision

- Real-Time Assistive Systems and Human-Computer Interfaces
- Neuroscience: - EEG Brain Research and Functional Brain Mapping
- Biomedical Applications in Flow Cytometry and Confocal Microscopy
- Robotics for Motion Planning and Automated Guidance
- Parallel and Distributed Processing

#### Sponsors

- National Science Foundation (NSF)
- Office of Naval Research (ONR)
- Miami Children's Hospital
- Beckman-Coulter Inc.

#### Faculty

**Malek Adjouadi**, *Director and Professor, Joint Appointment with Biomedical Engineering and Electrical and Computer Engineering*

**Armando Barreto**, *Director of the Digital Signal Processing Laboratory and Associate Professor, Joint Appointment with Biomedical Engineering and Electrical and Computer Engineering*

**Ana Pasztor**, *Professor, School of Computer Science*

**Gustavo Roig**, *Director, Center for Diversity in Engineering*

#### Research Partners

**Prasanna Jayakar**, *Director, Neuroscience Center, Miami Children's Hospital*

**Arthur Karshmer**, *Professor and Chair, Information Technology, University of South Florida*

**Rafael Delgado**, *Executive Vice President and Director of Software Systems, Intelligent Hearing Systems, Miami*

**Gustavo Rey**, *Neuropsychologist, Miami Children's Hospital*

#### Coordinator, Student Recruitment

**Stephanie Strange**, *College of Engineering and Computing, Assistant Director of Recruitment and Retention*

#### Research and Support Staff

**Mercedes Cabrerizo, Ph.D.** *Ware Foundation Research Fellow*

**Melvin Ayala**, *Manager, CATE Center*

**Magno Guillen**, *Postdoctoral Fellow, MRI Research for Pediatric Epilepsy*

**Maria Tito**, *Postdoctoral Fellow, Subural EEG Research in Epilepsy*

**Lu Wang**, *Postdoctoral Fellow, Automated Book Reader for the Blind*

**Mouncef Lahlou**, *Webmaster*

#### Doctoral Students:

Melvin Ayala, Javier Delgado, Yu Chen, Mohamed Gorawala, Ana Guzman, Mouncef Lahlou, Jin Wang, You Xiaozhen, Mildred Zabawa, Mark Rossman, Feng Gui

#### Master's Students:

Anas Salah Eddin, Gabriel Lizarraga

#### Industry Partners

- The Brain Institute Miami Children's Hospital
- The Ware Foundation
- Beckman-Coulter Inc.
- Intelligent Hearing Systems

- American Epilepsy Society
- Children's National Medical Center

#### Related Laboratories and Facilities of the CATE Infrastructure

With major funding from the National Science Foundation and the Office of Naval Research, the CATE center has helped establish the following laboratories:

1. EEG Brain Research Laboratory. *Funded by NSF-MRI* – Housed within the Neuroscience Center at Miami Children's Hospital.
2. Web-Design Laboratory. *Funded jointly by ONR and NSF-MII* – Housed within the Engineering Information Center Facility.
3. The Computer Training Laboratory – Housed in Graham Center with the Office of Multicultural Services.

#### Center for Diversity in Engineering and Computing

**Gustavo Roig**, *Director and Professor, Electrical and Computer Engineering*

**Berrin Tansel**, *Associate Director*

**Lourdes Barough**, *Executive Secretary*

**Francisco Fins**, *Program Coordinator*

**Jorge Nosti**, *Program Coordinator*

**Beatriz Oria**, *Program Specialist*

**Rebecca Ramos**, *Program Coordinator*

**Katina Vallina**, *Program Specialist*

South Florida's distinction as a multi-cultured, multi-lingual region has long been a diverse source of talent for FIU, particularly in the College of Engineering and Computing. In response to the challenge of attracting this diverse community to science and engineering, the College of Engineering and Computing has created a special center for Diversity in Engineering and Computing.

By building sound foundations in sciences and mathematics, the Center helps to prepare young students to deal with the rigors of higher-level education, and Engineering and Computing in particular. Currently the Center has several on-going programs as a service to the community and the University:

#### **Florida Action for Minorities in Engineering (FLAME)**

This is a cooperative program between Miami Coral Park Senior High School and Florida International University aimed at introducing the profession of engineering to high school students, and to identify, select, enroll and retain minority students in the engineering field. Senior High School students also registered for dual enrollment classes at FIU.

#### **Florida/Georgia Louis Stokes Alliance for Minority Participation (FGLSAMP)**

This is a National Science Foundation funded program in association with Florida Agricultural and Mechanical University (FAMU), the leading institution. This program focuses on engineering, math chemistry, biology, physics, and computer science undergraduate students. Participants receive scholarships, during the entire academic year based on high GPA and being a full time student. Opportunities for summer internships are available.

**Junior Engineering Technical Society (JETS) (TEAMS)**

The **JETS Test of Engineering Aptitude, Mathematics and Science (TEAMS)** is an academic problem-solving competition, that serves all public and private high schools within our geographical area with focus on a one day activity at Florida International University.

**(UNITE)**

A collaborative effort between Florida International University, the U.S. Army, and the Junior Engineering Technical Society. The JETS UNITE Program's goal is to increase the number of underrepresented students in the field of engineering, to improve the performance of the students in their SAT/ACT exams, develop resourceful, self-motivated well rounded graduates who will be responsible and well adjusted citizens.

**ENLACE/MIAMI The Children Trust**, this program is funded by The Children Trust and provide after school and summer programs for 650 children (ages 7-17) residing in the Sweetwater, Doral and West Kendall areas. The after school program will offer literacy support through individualized software-based reading intervention, social skills development, and health fitness education. The summer program will offer students the unique opportunity to attend classes on a university campus.

**GEAR UP Homestead**

The GEAR UP Homestead project assists a maximum number of students living within the Homestead area achieve a college career, while implementing a self-sustaining system to continuously duplicate the process. Homestead Florida is faced with serious issues that require assistance from other communities, such as poverty, lack of jobs, and problems related to disadvantaged societies. Fortunately, with the development of the GEAR UP Homestead Partnership Plan as well as the aide to public, private and governmental institutions, the targeted cohort students of the Homestead area will be able to reach their maximum potential through a college education. Partners such as the US Department of Education will supply a vast portion of the resources needed to perform this project. Aspira, a non-profit organization, is dedicated to creating leadership through education for those who are disenfranchised, or socially and economically disadvantaged. Another important team player is the Non-Violence Program of Miami, contributing the idea that knowledge is the best weapon against violence, and motivating young people to engage in positive action to make our communities safer.

The GEAR UP project is made of several components that contribute to a wider reach into insuring that a maximum result is gained by everyone involved. Among these components are in-school tutoring and assistance programs. The Summer Enrichment Program offers an alternative way of spending those long summer days. The teacher training Development Program, as well as PRISM (Program of Industry Supported Mentorship's) enrich teachers with the right preparation to confront all kinds of situations. Perhaps the most important aspect that will contribute to the outcome of the child is the parental influence and family involvement into their success. In a fast-paced and demanding society, this is often a difficult threshold to cross. Parent Involvement Program (PIP) encourages parents to have a positive active role in their child's every day awareness of the future. Education begins in the home and ends in the child's decision to instill a safe and productive future. The powerful drive

needed to assist the process of growth and awareness is the very reason for the existence of programs such as GEAR UP.

The mission of the partnership addresses the needs of the student by bringing the necessary awareness and readiness for a successful college education. To succeed such advancement, GEAR UP has established a mission, goals, objectives and outcomes that will serve as the foundation for a successful program. The dedication of the partnership as well as a Vision Statement that clearly unifies the community to serve its future provides an inspiration: that the education of today paves the road towards tomorrow's success.

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## Center of Emerging Technology for Advanced Information Processing and High-Confidence Systems (CREST)

**Naphtali Rishe**, *Director and Professor, School of Computing and Information Sciences*

The CREST center focuses on the following research areas: High-confidence reactive software systems, multidimensional-multimodal data modeling and query research, assistive technology research based on the design and development of real-time assistive systems, and advanced information processing with neuroscience applications. This multidisciplinary research and educational center serves as a resource for the education of underrepresented minority students as well as a driving force to increase diversity in graduate education, especially at the Ph.D. level in computer science and engineering.

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## Center for the Study of Matters at Extreme Conditions (CeSMEC)

**Surendra Saxena**, *Director and Professor, Mechanical and Materials Engineering*

**Jiuhua Chen**, *Deputy Director and Associate Professor, Mechanical and Materials Engineering*

**Andriy Durygin**, *Research Coordinator*

**Vadym Drozd**, *Research Assistant Professor*

**Helene Couvy**, *Research Assistant Professor*

CeSMEC's mission is to study the behavior of materials at high pressures and temperatures. The range of research activities includes the study of planetary interiors and of matter at extreme industrial conditions. CeSMEC is one of few facilities in the country where pressures are created to many million atmospheres and temperatures to several thousand degrees; the material is studied under such condition with x-ray and electroscopic techniques.

All materials are subject to three fundamental variables – the variables of temperatures, chemical composition, and pressure. Modern science has vigorously used only the first two variables in exploring nature and creating several amenities of modern civilization. Pressure, the third fundamental variable altering all states of matter, has been for years a relatively minor esoteric sub-field. The creation of this center is providing FIU's graduate students and faculty the opportunity to perform fundamental and applied research in high-pressure physics, high-pressure chemistry, and materials science. The center is raising the infrastructure at FIU to the level

required to initiate world-class research in an emerging area of science and engineering.

Recent additions of a Hydrogen-Storage Materials Research Facility and a Microplasma CVD Diamond Growing Laboratory, researcher can perform synthesis of novel materials for a variety of industrial applications.

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## Distributed Multimedia Information Systems Laboratory

**Shu-Ching Chen**, *Director and Professor, School of Computing and Information Sciences*

Another of our research efforts is the Distributed Multimedia Information System Laboratory (DMIS). Its mission is to conduct leading edge research in multimedia database systems, data mining, networking and wireless, GIS and Intelligent Transportation Systems. Other research areas of this effort include Multimedia Communications and Networking, Digital Library, 3D Animation, and Distributed Computing.

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## Division of External Programs

**Caesar Abi Shdid**, *Director and Professor, Department of Civil and Environmental Engineering*

The **Division of External Programs (DEP)** develops, promotes and manages academic programs offered under the rubric of Executive Engineering Education in the **College of Engineering and Computing**.

The DEP is managed by a director reporting to the Dean of Engineering & Computing. The director and staff of the DEP work with department chairs, center directors and faculty members to identify corporate and global partners; develop, promote and manage Executive Engineering Programs; Distance Learning Programs, and Continuing Education Programs; and identify new opportunities and new markets for all programs that are offered by the College of Engineering and Computing. Various categories of programs in which the DEP is involved include the following;

### Global Programs

The global programs focus on the demonstrated education and training needs of selected industrial sector(s) in the host country. These programs are offered in collaboration with a sponsor which is a reputed university or institution that can support the delivery of the program by providing appropriate infrastructure facilities like classrooms, library and computer laboratories. The programs are designed in consultation with the faculty of the sponsor and the industry representatives in the host country. The goal of the global programs is to complement the existing academic programs offered by the sponsoring institution.

### Global Programs

- Corporate Programs
- Certificate Programs
- Weekend Programs
- International Student Transfer Programs

The international student transfer program (Dual Degree Program) allows undergraduate students from foreign universities to complete approximately 75% of their curriculum at home institution and the remaining 25% at FIU, and receive their undergraduate degree from both

institutions. An articulation agreement ascertains the student's ability to transfer courses taken at home institution to FIU such that FIU's core curriculum and other undergraduate program requirements are met.

All participants in the program proceed as a cohort through a lock-step curriculum of the selected courses. The local faculty from the host country is also involved in teaching to enrich the program by integrating the economic, cultural, social, political and legal issues of the host country in the curriculum.

The international student transfer program (Faculty Development Program) allows the foreign universities, mostly in Latin America, to send their MS degree recipient faculty members to complete their PhD education at FIU. These students complete their coursework and dissertation proposals at FIU and then return to their home institutions where they complete their dissertation work. Agreements between the two universities allow for a lot of assistance to the students while they are working on their dissertation.

### Corporate and Executive Engineering Programs

The Corporate Programs are designed for an individual corporation leading to an academic degree, certificate or short-term executive development program. The programs are delivered on site and the program delivery is supported by providing infrastructure facilities. Corporate programs are designed to meet the specific educational and training needs of the corporate clients. Currently, we offer the following executive engineering certificate programs: "Lean Six Sigma", "Six Sigma Green Belt", "Six Sigma Black Belt", "ISO 9001", and "Supply Chain Management" certification programs every semester.

### Continuing Education Programs

The Continuing Education Programs are designed to meet the licensing and certification needs of individual professionals in the engineering and construction fields. The programs are delivered at various locations around Florida and online. The Continuing Education Programs can be conducted on site for companies. Currently, we offer the following continuing education programs: "FDOT Construction Training and Qualification Program (CTQP)", "FDOT Maintenance of Traffic in Construction Zones (MOT)", "Professional Engineering (PE) Licensing Exam Review Courses for the NCEES PE Civil, PE Mechanical, PE Electrical (Power), and PE Structural exams", "Fundamentals of Engineering Exam (FE) Review Course", "Florida General Contractor's Exam (GC) Review Course", "OSHA Training Certification Courses", "LEED Exam Prep Courses", "Florida Laws and Rules Seminars", and "Continuing Education Seminars (for PEs and GCs)".

### Distance Learning Programs

The Florida Engineering Education Delivery System (FEEDS) is a statewide distance learning system providing access to graduate and undergraduate level engineering courses and programs to individual students anywhere and anytime, whether it is at home or the workplace. Courses are delivered through streaming video over the Internet; and fully on-line.

FEEDS offers engineering students and professionals with work and family responsibilities the flexibility to take courses around their busy schedules. It also provides convenience to those who are not within driving distance of an academic institution. It allows them to continue their

professional development, which plays an important role in the growth of high technology industries.

Currently, students can select the necessary courses from FIU via distance learning to obtain a Master's degree in Civil Engineering, Environmental Engineering, Construction Management and Engineering Management and a bachelor's degree in Construction Management. Selected undergraduate courses are also available for the following undergraduate degree programs: Civil Engineering, Environmental Engineering, Mechanical Engineering, Biomedical Engineering, Electrical Engineering, and Computer Science.

A student taking a course through FEEDS must meet the same requirements as the student on campus and will earn the same credit as if he/she were to attend classes on campus. A student need not be enrolled in a graduate or undergraduate degree program in order to take a course. However, a student who intends to seek admission to a program should be aware that no more than six (6) graduate or fifteen (15) undergraduate credits are allowed to be transferred into a program.

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## Engineering Information Center (EIC)

**Hernan Bormey**, *Director*

Create a technology that will help save lives or create your own website, simulate an electronic circuit, design a bridge, or just browse the Internet. The possibilities are endless at Engineering Information Center.

EIC helps faculty, scientists, researchers, and students to conduct cutting edge research and work on system designs, networking, scientific visualization, 3D Modeling, simulations, virtual reality, computer animation, and other computer and software applications.

The Center manages an array of Novell, Windows, and UNIX network servers that provide faculty, staff and students with the capacity to share valuable resources; therefore, fostering an atmosphere where collaboration and instruction grow with a synergy that is unique. Beyond the college community, EIC participates in sponsoring special outreach programs for the Miami-Dade County Public Schools by exposing young minds to latest technologies.

EIC is also home to The Graphic Simulation Laboratory with focus on Scientific Visualization, 3D Computer Modeling, and Virtual Reality, which have helped researchers to develop a wide array of technologies, strategies, and information designs. GSL has collaborated with NASA, The Center for Super Computing Applications, National Science Foundation, Computational Science Institute, Shodor Organization, Macromedia, and Kellogg Foundation, just to mention a few. From hardware to software support to 3D modeling of a heart valve, EIC delivers exceptional services with a personal touch.

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## Engineering Manufacturing Center (EMC)

**Cesar Levy**, *Director, Chairperson and Professor,  
Mechanical and Materials Engineering*  
**Mario Sanchez**, *Senior Engineer and Manager*  
**Richard Zicarelli**, *Coordinator*

The Engineering Manufacturing Center provides technical expertise in manufacturing to anyone in need of assistance. Typically the Center supports researchers, graduate and undergraduate students with projects requiring high-precision quality fabrication and requiring expert technical guidance. Undergraduate engineering students represent the largest group served. Students of all academic departments benefit directly through help with class projects, such as Senior Design (capstone) courses, critical components of all ABET accredited Engineering programs in the College. Other major undergraduate projects supported include the Mini-Baja, Mini-Submarine and Robot Competitions. Graduate students regularly request fabrication assistance with experimental devices, tools and fixtures. The Center's main facility supports the College's academic departments' general fabrication needs, including equipment repair, assembly, fixturing, installation, etc. An auxiliary EMC-supervised machine shop is available for student hands-on project work.

The Center also provides technical services to the outside community such as entrepreneurial consulting in product design and development and sub-contract fabrication work. Companies served by the EMC range from entrepreneurial to the well-established, some of which include aerospace, automotive, marine, medical and consumer product manufacturers. The Center runs state-of-the-art CAD/CAM software and operates a diverse array of rapid prototyping equipment combined with CNC capabilities providing a wide variety of fabrication processes. In addition, the Center can perform inspection, measurement and reverse engineering capabilities through its automated measurement equipment.

For more information, contact the EMC by calling Mr. Richard Zicarelli (305) 348-6557 or Mr. Mario Sanchez ([sanchem@fiu.edu](mailto:sanchem@fiu.edu)), or refer to the center's website at <http://www.eng.fiu.edu/emc/>.

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## Eugenio Pino and Family Global Entrepreneurship

**Alan L. Carsrud**, *Executive Director*

The Eugenio Pino and Family Global Entrepreneurship Center at Florida International University, founded in 2003 with a grant from the Kauffman Foundation of Kansas City, facilitates all entrepreneurial activities at FIU. The Center provides campus-wide awareness of entrepreneurship as an approach to life that enhances and transcends traditional academic experiences. It is woven into the fabric of the university through entrepreneurial activities and courses across the university. The multi-dimensional nature of the Center allows it to address the unique entrepreneurial needs of one of the nation's largest ethnically diverse academic institutions, located in one of America's most entrepreneurial and dynamic international cities, Miami. In 2004 the Center was named for Eugenio Pino a Cuban-American serial entrepreneur and his family.

## High Performance Database Research Center

**Naphtali Rishe**, *Director and Professor, School of Computing and Information Sciences*

One of our research efforts is the High-Performance Database Research Center (HPDRC). HPDRC conducts research on such theoretical and applied issues as Internet-distributed heterogeneous databases, database design methodologies, database design tools, information analysis, multi-media databases, database languages, data compression, spatial databases, and data visualization. The Center also designs specific database systems for highly complex applications.

## International Hurricane Research Center (IHRC)

**Stephen P. Leatherman**, *Director*

**Kegi Zhang**, *Laboratory for Coastal Research, Co-Director*

**Shahid Hamid**, *Laboratory for Insurance, Financial and Economic Research, Director*

**Arindam Chowdhury**, *Laboratory for Wind Engineering Research, Director, and Assistant Professor, Civil and Environmental Engineering*

**Dario Moreno**, *Laboratory for Social Science Research, Director*

Florida International University's International Hurricane Center has officially changed its name to the International Hurricane Research Center (IHRC). The change was made to better reflect the Center's research initiatives.

Serving the state of Florida, the IHRC is a Type I interdisciplinary research center focused on the mitigation of hurricane damage to people, the economy, and the built and natural environments. This designation makes the IHRC Florida's official hurricane research center for 11 universities comprising the state university system.

The citizens of the U.S. East and Gulf Coasts and Caribbean Islands are severely impacted by hurricanes, and IHRC promotes an interdisciplinary, large-scale disaster research agenda to address this vulnerability. Disciplines such as architecture, business, economics, engineering, finance, geosciences, insurance, political science, sociology, and urban planning are involved in a long-term, integrated research program that helps Florida, the nation, and its regional neighbors to mitigate hurricane exposure.

The Center developed as a result of a public-private partnership between the We Will Rebuild Foundation, an organization formed to spearhead the rebuilding of Dade County in 1992 after Hurricane Andrew, and FIU. The IHRC works in conjunction with the National Hurricane Center, which is also located at the FIU Modesto A. Maidique Campus in West Miami-Dade.

## Lehman Center for Transportation Research (LCTR)

**L. David Shen, P.E., T.E.** *Director and Professor, Civil and Environmental Engineering*

**Fang Zhao, P.E.** *Deputy Director, Interim Chair and Professor, Civil and Environmental Engineering*

**Sylvan C. Jolibois, Jr.**, *Deputy Director and Associate Professor, Civil and Environmental Engineering*

**Albert Gan**, *Deputy Director and Associate Professor, Civil and Environmental Engineering*

**Favian Cevallos**, *Transit Program Director*

The Lehman Center for Transportation Research (LCTR) at Florida International University was established in 1993 in honor of Congressman Bill Lehman and his tireless efforts to make South Florida a better place for all of us. The center's vision is to become a 'state-of-the-art' transportation research and training facility. LCTR is committed to serve and benefit our society by conducting research to improve mobility, hence the quality of life issues, develop partnerships in the transportation industry, and educate a multidisciplinary workforce to plan, manage and implement transportation systems.

Faculty, staff and students at LCTR are involved in research related to the planning, design, operation and maintenance of transportation systems, including intelligent transportation systems, public transportation, highway transportation, aviation, and freight; as well as public policy, air pollution, and the application of geographic information systems and other advanced technologies such as artificial neural networks and scientific visualization in transportation. Future plans include networking with the public and private industry to collaborate on transportation related research. In addition, applied research will be conducted on, but not limited to intelligent vehicle and highway systems.

## Motorola Nanofabrication Research Facility

**W. Kinzy Jones**, *Director and Professor, Mechanical and Materials Engineering*

**Neal Ricks**, *Lab Manager*

The first centralized facility of its kind in Florida, the Motorola Nanofabrication Research Facility is an open-access initiative in support of nano-scale devices, systems and materials research that encompasses a broad range of technologies and capabilities. The facility provides nanofabrication, analytical instrumentation, materials characterization and process-development laboratories for students, faculty and industrial researchers. This \$15 million Research Facility is an integral part of the Advanced Materials Engineering Research Institute (AMERI), FIU's broader materials research program.

Harnessing the synergy inherent in the study and development of nanoscale technologies, the facility boasts:

- Specialized equipment required to develop new and novel fabrication techniques unique to the creation of functional materials and devices that are no greater than 100 nanometers (1,000 times smaller than the diameter of a human hair);
- A full complement of standard semiconductor processing equipment to leverage the capabilities of robust and proven techniques; and
- State-of-the-art analytical tools to study, and characterize these nano-sized devices, as well as the materials and processes used to make them.



**The Nanotechnology Faculty Team**

**Arvind Agarwal**, Associate Professor, Mechanical and Materials Engineering

**Wonbong Choi**, Associate Professor, Mechanical and Materials Engineering

**George Dulikravich**, Professor and Chair, Mechanical and Materials Engineering

**Grover Larkins**, Professor, Electrical and Computer Engineering

**Watson Lees**, Associate Professor, Chemistry

**Chenzhong Li**, Assistant Professor, Biomedical Engineering

**Wenzhi Li**, Assistant Professor, Physics

**Anthony McGoron**, Associate Professor and Interim Chair, Biomedical Engineering

**Roberto Panepucci**, Assistant Professor, Electrical and Computer Engineering

**Surendra Saxena**, Professor, Mechanical and Materials Engineering

**Frank Urban**, Associate Professor, Electrical and Computer Engineering

**Yuriy Vlasov**, Research Engineer

**Chunlei (Peggy) Wang**, Associate Professor, Mechanical and Materials Engineering

**Structures and Construction Laboratory**

**Amir Mirmiran**, Director

**Nakin Suksawang**, Deputy Director

**Edgar Polo**, Lab Manager

Structures and Construction Laboratory (SCL) is established to provide hands-on educational experience for students; to research and development of innovative hurricane-resistant and durable construction materials, structural systems and components; to serve the construction industry; to contribute to the engineering community in South Florida, and to advance the safety, durability, and economy of our civil infrastructure.

The Structures and Construction Laboratory was built through the help of a consortium of 21 industry partners who donated materials, services, and cash in excess of \$250,000. It is one of the largest facilities in the State of Florida and is equipped with a full-scale structural testing system (FSST). The FSST consists of a 15 ft tall testing frame that stands above a 35 ft x 65 ft strong concrete floor with 4 ft thickness and 100,000 lbs capacity tie-downs on a 3 ft x 6 ft pattern. The steel frame is capable of testing full-scale structural members, such as a 65 ft bridge girder. The applied load is replicated using a fatigue rated tension/compression actuator that is capable of performing cyclic loading. In addition to the FSST, the SCL is also equipped with other material testing systems, including a universal testing machine, compression machine, and small-scale load frames.

**Telecommunications and Information Technology Institute**

**Niki Pissinou**, Director and Professor, School of Computing and Information Sciences

Florida International University (FIU) recognizes the need to nurture highly trained personnel for the nation's industry and business, develop research to support the rapidly

expanding high-tech industry and become proactive in technology transfer. Thus, ensuring continued economic growth and prosperity in the region. In order to fully meet today's technological demands, FIU has established the Telecommunications and Information Technology Institute (IT<sup>2</sup>). IT<sup>2</sup> promotes advanced multidisciplinary education and research focused on telecommunications and information technologies. IT<sup>2</sup>'s mission is to:

1. Deliver high quality telecommunications and information technology education and training.
2. Conduct and promote research to enhance Florida's role as a leader in telecommunications and information technology.
3. Offer training that is needed to foster business development and workforce preparedness.
4. College of Engineering and Computing Graduate 348 Catalog 2007-2008 Promote technology transfer to enhance the enabling technologies of the telecommunication and information technology industries.

In fulfilling its mission, IT<sup>2</sup> promotes multidisciplinary collaboration and serves as the catalyst to promote intellectual cross-fertilization among disciplines. This effort results in the synergistic enhancement of teaching and research, so critical in the telecommunications and information technology fields, where disciplinary barriers are falling and lines are blurred. An objective of the Institute is to infuse telecommunications and information technology content into the curriculum at all appropriate levels. To fill the urgent demand of industry, the institute is developing interdisciplinary telecommunication programs that provide certificate programs, Bachelors, Masters and Ph.D. degrees.

IT<sup>2</sup> constitutes an infrastructure that is viable for cutting edge research activities. Researchers at the institute conduct funded research and development targeted at solving complex problems conducive to the early identification of high impact opportunities. Of particular importance to the institute's research efforts is the emerging global wireless, optical and personal communications infrastructure and the ability to represent, store and access information to perform a variety of information related tasks. To provide an effective forum for original research results and to foster communication among researchers, industry leaders can collaborate on education, training, and re-engineering the telecommunications workforce of the future. The alliance provides effective ways to educate the workforce of the 21st century. In accordance, the institute provides technical assistance and applied research services to transfer acquired knowledge and technologies to the commercial sector. The IT<sup>2</sup> team can work with industrial organizations to tap into some technological innovations that drive the industry to its strategic advantage.

For more information, contact Dr. Niki Pissinou, the director of the Telecommunications and Information Technology Institute, at (305) 348-3987 or visit our Website at [www.it2.fiu.edu](http://www.it2.fiu.edu).

**Core Faculty**

**Niki Pissinou**, Director and Professor

**Deng Pan**, Assistant Professor

**Hao Zhu**, Assistant Professor

***Affiliated and Research Faculty***

**Kang Yen**, Chairperson and Professor, Electrical and  
Computer Engineering

**Wannava Subbarao**, Professor, Electrical and  
Computer Engineering

**Tadeuz Babij**, Professor, Electrical and Computer  
Engineering

**Jean Andrian**, Associate Professor, Electrical and  
Computer Engineering

**Shih-Ming Lee**, Associate Professor, Engineering  
Management Program

**Osama Mohammed**, Professor, Electrical and  
Computer Engineering