

College of Engineering and Computing

Dean

Associate Dean for Academic Affairs

Associate Dean for Research

Associate Dean for Undergraduate

Education

John Volakis

Anthony J. McGoron

Osama Mohammed

Arvind Agarwal

Mark A. Weiss

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 two schools: School of Computing and Information Sciences and Moss School of Construction, Infrastructure and Sustainability; and four 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 Information Center (EIC), 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 and Computer 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
- Water Resources 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 and Computer 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
- Cybersecurity
- Data Science
- Electrical Engineering
- **Engineering Management**
- Environmental Engineering
- Information Technology
- Logistics Engineering
- Materials Science and Engineering
- Mechanical Engineering
- Telecommunications and Networking

Distance Learning Programs

The Office of Distance Education (ODE) provides 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.

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)
- Center for Advanced Technology and Education (CATE)
- Center for the Study of Matters at Extreme Conditions (CeSMEC)

- Engineering Manufacturing Center (EMC)
- Florida Center for Cyber Infrastructure Education and Research for Trust and Assurance
- High Performance Database Research Center
- Industry/University Cooperative Research Center (I/UCRC) Center for Advanced Knowledge Enablement (CAKE)
- International Hurricane Research Center (IHRC)
- Lehman Center for Transportation Research (LCTR)
- Motorola NanoFabrication Research Facility
- Telecommunications and Information Technology Institute (IT2).

Student Success Services

The office of Student Success Services is responsible for the coordination of student services at the University. Students are informed of educational opportunities such as scholarships, tuition waivers, and campus resources.

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. Contact information of the Graduate Programs Directors can be found at: cec.fiu.edu/resources/students/advising/graduate-program-directors/

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: cec.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: cec.fiu.edu

Admissions:

<http://gradschool.fiu.edu> (305) 348-7442

College of Engineering and Computing-

Graduate Admissions (305) 348-7442

Campus Resources (305) 348-2522

Career Services (305) 348-1281

Financial Aid	(305) 348-7000
University Graduate School	(305) 348-2455
International Students and Scholars Services	(305) 348-2421
Registrar's Office	(305) 348-2320
Scholarships	(305) 348-0349
Tuition Waivers	(305) 348-7000

Enterprise and Logistics Engineering

Chin-Sheng Chen, *Professor and Program Director*

Shih-Ming Lee, *Professor of Practice*

Karen E. Schmahl, *Professor of Practice*

Shabnam Rezapour, *Assistant Professor*

Affiliated and Research Faculty

Cecilia Alvarez-Ortiz, *Affiliated Professor*

Paul Bianco, *Affiliated Professor*

Seema Pissaris, *Affiliated Professor*

Jesus Sanchelima, *Affiliated 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. Additional business electives may be considered subject to the Director's approval. A suggested list of business elective courses is given below:

ACG 6026	Accounting for Managers	3
EIN 5359	Industrial Financial Decisions	3
EIN 6160	Management of Innovation and Technology	3
EIN 6325	Business Plan Development	3
FIN 6406	Corporate Finance	3
FIN 6425	Financial Management Policies	3
FIN 6487	Financial Risk Management- Financial Engineering	3
MAN 6209	Organization Design and Behavior	3
MAR 6805	Marketing Management	3
MAN 6830	Organization Information Systems	3
MAN 6501	Operations Management	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 5505C	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	Hardware Description Languages (VHDL or Verilog)	3
EEL 5757	Real-Time DSP Implementations	3
EEL 6167	VLSI Design	3
EEL 6253	Computer Analysis of Power Systems	3
EEE 6502	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	Advanced Software Engineering	3
COP 5725	Principles of Database Management Systems	3
COP 5614	Operating Systems	3
COT 5310	Theory of Computation I	3
COT 5407	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 5716	Productivity in Construction	3
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.

EEE 5425	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

EEE 6502 Digital Signal Processing 3

Enterprise Systems Track

This track is designed for students who have a career interest in management of operations at the entire enterprise level. Systems engineering tools and information technology are applied to planning, modeling, analysis, design, and implementation of contemporary enterprise systems in any business sector. 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.

EGS 5620 Enterprise Systems Configuration 3
 EGS 5621 Enterprise Systems Collaboration 3
 EGS 5622 Enterprise Systems Integration 3
 EGS 5623 Enterprise Systems Optimization 3
 EIN 5346 Logistics Engineering 3
 EN 5367 Design of Production Systems 3
 EIN 6133 Enterprise Engineering 3
 EIN 6336 Advanced Production Planning and Control 3
 EIN 6345 Inventory Control Systems 3

Engineering Entrepreneurship Track

This track is designed for students who have a career interest in becoming an engineering entrepreneur who creates jobs in new business ventures or becoming an engineering manager who manages innovation working within a company. 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 5550 Risk Analysis in Business Concept Development for Engineers and Entrepreneurs 3
 EGN 5644 Commercializing Innovation 3
 EGN 6436 Manufacturing Process Design 3
 EIN 5367 Design of Production Systems 3
 EIN 6105 Technology Policies and Strategies 3
 EIN 6160 Management of Innovation and Technology 3
 EIN 6324 Technology Entrepreneurship 3
 EIN 6325 Business Plan Development 3
 EIN 6327 Entrepreneurship and New Venture Initiation 3
 EIN 6329 Advanced Engineering Business Plan Development 3
 EIN 6392 Product Design for Manufacturability and Automation 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 Fundamentals of Computer Security 3
 CEN 5087 Software and Data Modeling 3
 COP 5725 Principles of Database Management Systems 3
 TCN 5030 Computer Communications and Networking Technology 3
 EGS 5620 Enterprise Systems Configuration 3
 EGS 5621 Enterprise Systems Collaboration 3
 EGS 5622 Enterprise Systems Integration 3
 EGS 5623 Enterprise Systems Optimization 3
 EIN 6117 Advanced Industrial Information Systems 3
 EIN 6133 Enterprise Engineering 3
 ESI 5602 Engineering Data Representation and Modeling 3
 ESI 6601 Data Warehousing and Mining 3

Logistics 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 5346 Logistics Engineering 3
 EIN 5367 Design of Production Systems 3
 EIN 6133 Enterprise Engineering 3
 EIN 6336 Advanced Production Planning and Control 3
 EIN 6345 Inventory Control Systems 3
 ESI 5522 Simulation Models of Engineering Systems 3
 ESI 5010C Forecasting and Demand Management 3
 ESI 6316 Applications of OR in Manufacturing 3
 ESI 6470 Stochastic Optimization 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 Applications 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 Optimization Algorithms 3

EML 5530	Intermediate CAD/CAE	3
EML 5606C	Advanced Refrigeration and AC Systems	3
EML 5709	Intermediate Fluid Mechanics	3
EML 6725	Computational Fluid Dynamics	3

Operations Management of Orthotics and Prosthetics Track

Students in this track must take six credit hours of EGN 6940 Graduate Internship – Orthotics and Prosthetics Clinical Rotation or I&SE Internship (EIN 6940), and additionally are required to take at least six credit hours of courses from the following list. Additional courses may be selected with approval of the program director.

EGN 5435	Product Modeling	3
EGS 5620	Enterprise Systems Configuration	3
EGN 6436	Manufacturing Process Design	3
EGN 6438	Manufacturing Engineering	3
EGN 6940	Graduate Internship - Orthotics and Prosthetics Clinical Rotation	1-6
EIN 6133	Enterprise Engineering	3
EIN 6160	Management of Innovation and Technology	3
EIN 6324	Technology Entrepreneurship	3
EIN 6336	Advanced Production Planning and Control	3
EIN 6392	Product Design for Manufacturability and Automation	3

Production and Manufacturing 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 5540	Quality and EH&S Management Systems	3
EGN 6436	Manufacturing Process Design	3
EIN 5332	Quality Engineering	3
EIN 5367	Design of Production Systems	3
EIN 6336	Advanced Production Planning and Control	3
EIN 6345	Inventory Control Systems	3
EIN 6392	Product Design for Manufacturability and Automation	3
ESI 5010C	Forecasting and Demand Management	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
FIN 6487	Financial Risk Management- Financial Engineering	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.

EGN 5540	Quality and EH&S Management Systems	3
EIN 5332	Quality Engineering	3
EIN 5346	Logistics Engineering	3
EIN 5367	Design of Production 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 5010C	Forecasting and Demand Management	3
ESI 5522	Simulation Models of Engineering Systems	3
ESI 6316	Applications of OR in Manufacturing	3
ESI 6440	Integer Programming	3
ESI 6470	Stochastic Optimization	3
ESI 6524	Advanced Industrial Systems Simulation	3
ESI 6546	Network Flow Analysis	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	Stochastic 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 6916) 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. Students who already have earned (or are earning) a Master's degree that is closely related to his/her technical track (i.e., MSEM sub-plan) may transfer up to 12 semester hours to meet the track requirement, subject to the Program Director's approval. 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.

Combined BS in Biomedical Engineering/MS in Engineering Management (BSBME/MSEM)

Students who pursue a BS degree and have completed 75–90 credits in the undergraduate program of Biomedical Engineering with an overall GPA of 3.2 or higher may, upon recommendation from three faculty members, apply to the department to enroll in the combined BSBME/MSEM program. Students must also submit an online application to the University Graduate School for admission to the MSEM program. In addition to the admission requirements of the MSEM program, students must meet all the admission requirements of the University Graduate School.

Students need only apply once to the combined degree program, but the application must be submitted to Graduate Admissions before the student starts the last 30 credits of the bachelor's degree program. A student admitted to the combined degree program will be considered to have undergraduate status until the student applies for graduation from their bachelor's degree program. Upon conferral of the bachelor's degree, the student will be granted graduate status and be eligible for graduate assistantships.

Students enrolled in the combined degree program could count up to three BME graduate courses for both the BSBME electives and the MSEM electives, for a total saving of 9 credit hours. The following is a list of eligible BME graduate courses:

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

The combined BSBME/MSEM program has been designed to be a continuous program. During this combined BSBME/MSEM program, upon completion of all the requirements of the BSBME program, students will receive their BSBME degree. Students may elect to permanently leave the combined program and earn only the BSBME degree. Students who elect to leave the combined program and earn only the BS degree will have the same access requirements to regular graduate programs as any other student, but will not be able to use the 9 credit hours in both the BSBME and MSEM degrees.

For each of the graduate courses counted as credits for both BSBME and MSEM degrees, a minimum grade of "B" is required. Only graduate courses with formal lecture can be counted for both degrees. The students are responsible for confirming the eligibility of each course with their undergraduate advisors.

Students interested in the combined program should consult with their undergraduate advisor on their eligibility to the program. The student should also meet the MSEM Program Director to learn about the graduate program and available tracks/courses before completing the application form and submitting it to their undergraduate advisor. Final decision for admission to the MSEM program will be made by the University Graduate School upon recommendation by the Engineering Management