
Engineer
Construction
Telecommunications
Systems
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Communications
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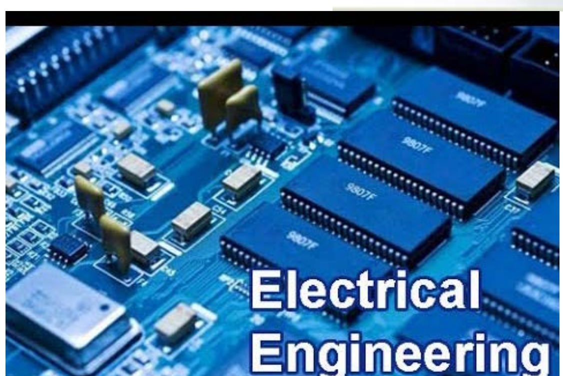
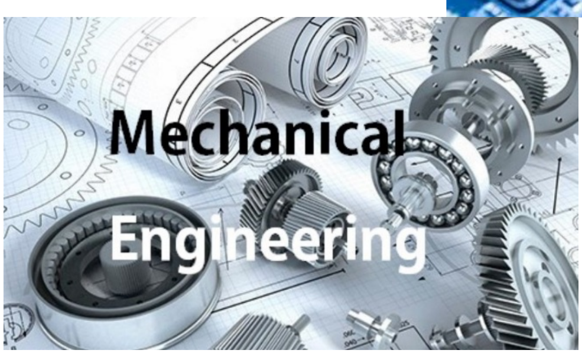
Civil Engineering


Electrical
Engineering


Mechanical
Engineering

College of Sciences and Engineering

Dean: Dr. Patrick Carriere

Master of Engineering (ME/ENGR)

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University of Alabama

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MASTER OF ENGINEERING

Southern University at Baton Rouge is offering the Master of Engineering program in the College of Sciences and Engineering. The objective of the Master of Engineering program is to prepare graduates for leadership positions in the engineering profession. Emphasis is placed on solving practical problems in industry and society, in general, for the advancement of technology and the benefit of mankind. Focus is on applied research with a strong tie to industry, federal agencies and economic development within the state. The program is interdepartmental and interdisciplinary with three specialty areas.

SPECIALTY AREAS

The Master of Engineering program is interdepartmental (Civil Engineering, Electrical Engineering, and Mechanical Engineering) and interdisciplinary. It has three specialty areas:

Specialty Area 1: **Materials Science and Engineering**

Track 1: Advanced Engineering Materials Track 2: Electronic Materials and Processing

Specialty Area 2: Sustainable Systems Engineering Track 1: Environmental and Water Resources Engineering Track 2: Thermal Science and Engineering

Track 3: Telecommunication and Computer Network Engineering

Specialty Area 3: Engineering Management

ADMISSION REQUIREMENTS

All general admission requirements of the Graduate School at Southern University apply for admission to the Master of Engineering program. In addition, a minimum GPA of 2.7 on all undergraduate work, or 3.0 on all graduate work completed, based on a 4.0 scale, are required. For the 4 + 1 option, a 3.0 GPA is required on all graduate work.

The GRE is optional for regular admission to all four Master of Engineering program options. For consideration for financial support (scholarships, fellowships, assistantships), the GRE is required, with a minimum composite score of 298.

DEGREE OPTIONS/GRADUATION REQUIREMENTS

The Master of Engineering program offers four degree options:

1. Master of Engineering degree with a thesis.
2. Master of Engineering degree with an engineering project.
3. Master of Engineering degree coursework only.
4. Master of Engineering degree 4 + 1.

The number of semester credit hours for each degree option is presented in the Table below:

Degree Option	Number of Credit Hours for Core Courses	Number of Credit Hours For Electives	Number of Credit Hours For Thesis or Project	Total Credit Hours
Master of Engineering (with Thesis)	12	12	6	30
Master of Engineering (with Project)	12	15	3	30
Master of Engineering (Coursework Only)	12	18	--	30
Master of Engineering 4 + 1	12	18	--	30

Master of Engineering Degree Options

If the thesis option is chosen, a student must successfully complete a total of thirty (30) semester credit hours with twenty four (24) credit hours of course work and six (6) credit hours of thesis. If the engineering project option is chosen, a student must successfully complete a total of thirty (30) semester credit hours with twenty seven (27) credit hours of course work and three (3) semester credit hours of engineering project. A maximum of two 400-level undergraduate courses may be selected to meet the credit hours requirement provided these two courses meet the conditions set forth in the course numbering section of the graduate catalog.

If the coursework only option is chosen, a student must successfully complete thirty (30) semester hours of coursework. Regular graduate school rules for maintaining a 3.0 GPA apply to the coursework only option. If the 4+1 option is chosen, a student must successfully complete thirty (30) hours of coursework, twelve (12) of which may be taken during the senior year of undergraduate study. The twelve (12) hours taken during the senior year will consist of 400 level courses that have been identified as "dual credit" courses that are suitable for either undergraduate or graduate credit depending on the level of rigor.

Engineering students may apply to the 4+1 option in the second semester of their junior year. Admission will be only be granted if all 300 level engineering courses have been completed and the student has an overall GPA of 3.0 and a GPA of 2.7 in all engineering courses. These GPA requirements must be met each semester an undergraduate student is in the 4+1 option, with the further stipulation that there must be a 3.0 GPA in the 12 dual credit graduate courses. After formal admission to the Master of Engineering program, the regular GPA requirement of 3.0 on all graduate work applies.

Financial support for coursework only and 4+1 students will only be in the form of laboratory assistantships or teaching assistantships. These assistantships will only be available after the first semester with a GPA of 3.3 or above.

Students in the coursework only and 4+1 options must take and pass the Fundamentals of Engineering (FE) exam, preferably by the end of their third semester. Passing this nationally standardized exam will enhance the students' competitive position for employment.

All incoming students are required to take the one-hour graduate seminar (ENGR 577).

The thesis option is recommended for those students wishing to conduct basic research and perhaps pursue a doctoral degree in the future. The student must write a thesis on the research and defend it. The project option requires an engineering project to be completed under the supervision of experienced engineers in industry and/or government and a graduate faculty advisor. The coursework only option is recommended as a professional development degree for working engineers. The 4+1 option is recommended for students who wish to enter the professional job market with an advanced level of technical knowledge and professional development.

Students are advised that the project, coursework only, and 4+1 options are non-research oriented, and that courses taken in these options might not transfer to a doctoral program without meeting additional requirements.

Students lacking an undergraduate degree in Engineering must show competency in math and science and will be required to take foundational engineering courses. These courses will be considered prerequisites and will not count toward the fulfillment of the core course requirement. General rules and policies by the Graduate School for thesis or non-thesis program will be applied to the Master of Engineering Program.

A student may change from one option to another. However, this could cause considerable delay in graduation because of the way the options are structured. Accordingly students must carefully choose a matriculation option. Students should also be aware that Financial support for coursework only and 4+1 students will only be in the form of laboratory assistantships or teaching assistantships. These assistantships will only be available after the first semester with a GPA of 3.3 or above.

ADVISORY COMMITTEE

For the thesis and project options, a student should define his/her specialty area with the approval of the advisory committee soon after admission to the program. The graduate faculty advisor, the graduate committee, and the director of the graduate program must approve the student's plan of study. No more than six credits from a previous master degree program may be applied toward a second master degree. These credits are applied only with the written approval of the Dean of the Graduate School, the graduate faculty advisor, and the director of the graduate program in which the second master degree is pursued.

For the coursework only and 4+1 options, an advisory committee is not

required. The student would choose an advisor based on the student's interests and the advisor's area(s) of expertise.

PLAN OF STUDY

Specialty Area 1: Materials Science and Engineering: Track 1: Advanced Engineering Materials

Course No.	Course Title	Credit Hours
Core Courses (Select 9 Hours)		
ENGR 500	Probability and Statistics for Engineers	3
ENGR 520	Mathematical Methods in Engineering	3
ENGR 530	Advanced Computer Applications for Engineers	3
ENGR 540	Fundamentals of Engineering Materials	3
ENGR 550	Numerical Methods for Engineering Applications	3
ENGR 560	Optimization Theory and Methods	3
Core Course (Select 3 Hours)		
ENGR 570	Engineering Management Methods	3
MBAP 538	Project Management	3
Elective Courses (Select 12 to 18 Hours)		
MEEN 430	Introduction to Finite Elements	3
MEEN 551	Fracture Mechanics and Fatigue in Materials	3
MEEN 552	Corrosion Science & Engineering	3
MEEN 563	Composite Materials	3
MEEN 565	Characterization of Materials	3
MEEN 588	Topics in Materials Science and Engineering	3
Elective(s)	(Other Specialty Areas)	3-6
Degree Options (Select 3 or 6 Hours)		
ENGR 599	Engineering Project (Non Thesis Option)	3
ENGR 600	Thesis	6
TOTAL		**30**

Foundation Courses

A student lacking an undergraduate degree in engineering must show competency in the following courses

MATH 264	Calculus I	4
MATH 265	Calculus II	4
MATH 395	Calculus III and Differential Equations	4
CHEM 112	General Chemistry Lab	1
CHEM 132	General Chemistry	3
PHYS 221/223	General Physics/Lab	4
PHYS 222/224	General Physics II/Lab	4
MEEN 227	Mechanics of Materials	3
MEEN 235	Materials Science and Engineering	3
MEEN 335	Material Processing	3

Specialty Area 1: Materials Science and Engineering:

Track 2: Electronic Materials and Processing

Course No.	Course Title	Credit Hours
Core Courses (Select 9 Hours)		
ENGR 500	Probability and Statistics for Engineers	3
ENGR 520	Mathematical Methods in Engineering	3
ENGR 530	Advanced Computer Applications for Engineers	3
ENGR 540	Fundamentals of Engineering Materials	3
ENGR 550	Numerical Methods for Engineering Applications	3
ENGR 560	Optimization Theory and Methods	3
Core Course (Select 3 Hours)		
ENGR 570	Engineering Management Methods	3
MGMT 587	Project Management	3
Elective Courses (Select 12 to 18 Hours)		
ELEN 418	Theory and Fabrication of Solid-State Devices	3
ELEN 419	Integrated Circuit Analysis	3
ELEN 526	Solid State Physics	3
ELEN 536	Physics of Semiconductor Devices	3
ELEN 541	Integrated Circuit Processing & Fabrication and Lab	3
ELEN 544	Integrated and Fiber Optics	3
ELEN 546	VLSI Technology	3
ELEN 589	Topics in Electronic Materials and Processing	3
Elective(s)	(Other Specialty Areas)	3-6
Degree Options (Select 3 or 6 Hours)		
ENGR 599	Engineering Project (Non Thesis Option)	3
ENGR 600	Thesis	6
TOTAL		**30**

Foundation Courses

A student lacking an undergraduate degree in engineering must show competency in the following courses:

MATH 264	Calculus I	4
MATH 265	Calculus II	4
MATH 395	Calculus III and Differential Equations	4
CHEM 112	General Chemistry Lab	1
CHEM 132	General Chemistry	3
PHYS 221/223	General Physics/Lab	4
PHYS 222/224	General Physics II/Lab	4

ELEN 212	Electronic Properties of Matter	4

Specialty Area 2: Sustainable Systems Engineering

Track 1: Environmental and Water Resources Engineering

Course No.	Course Title	Credit Hours
Core Courses (Select 9 Hours)		
ENGR 500	Probability and Statistics for Engineers	3
ENGR 520	Mathematical Methods in Engineering	3
ENGR 530	Advanced Computer Applications for Engineers	3
ENGR 540	Fundamentals of Engineering Materials	3
ENGR 550	Numerical Methods for Engineering Applications	3
ENGR 560	Optimization Theory and Methods	3
Core Course (Select 3 Hours)		
ENGR 570	Engineering Management Methods	3
MBAP 538	Project Management	3
Elective Courses (Select 12 to 18 Hours)		
CIEN 421	Water and Wastewater Analysis	3
CIEN 462	Design of Water & Sewage Treatment Plants	3
CIEN 475	Solid/Hazardous Waste Management	3
CIEN 511	Solid/Hazardous Waste Management	3
CIEN 512	Biological Waste Treatment	3
CIEN 515	Advanced Industrial Waste Treatment	3
CIEN 516	Groundwater Pollution Remediation	3
CIEN 588	Topics in Environmental Engineering	3
Elective(s)	(Other Specialty Areas)	3-6
Degree Options (Select 3 or 6 Hours)		
ENGR 599	Engineering Project (Non Thesis Option)	3
ENGR 600	Thesis	6
TOTAL		**30**

Foundation Courses

A student lacking an undergraduate degree in engineering must show competency in the following courses:

MATH 264	Calculus I	4
MATH 265	Calculus II	4
MATH 395	Calculus III and Differential Equations	4
CHEM 112	General Chemistry Lab	1
CHEM 132	General Chemistry	3
PHYS 221/223	General Physics	4
PHYS 222/224	General Physics II	4
CIEN 325	Introduction to Environmental Engineering	3
CIEN 321 or MEEN 312	Fluid Mechanics	3

Specialty Area 2: Sustainable Systems Engineering

Track 2: Thermal Science and Engineering

Course No.	Course Title	Credit Hours
Core Courses (Select 9 Hours)		
ENGR 500	Probability and Statistics for Engineers	3
ENGR 520	Mathematical Methods in Engineering	3
ENGR 530	Advanced Computer Applications for Engineers	3
ENGR 540	Fundamentals of Engineering Materials	3
ENGR 550	Numerical Methods for Engineering Applications	3
ENGR 560	Optimization Theory and Methods	3
Core Course (Select 3 Hours)		
ENGR 570	Engineering Management Methods	3
MBAP 538	Project Management	3
Elective Courses (Select 12 to 18 Hours)		
MEEN 421	Thermal Environmental Engineering	3
MEEN 574	Advanced Applied Heat Transfer	3
MEEN 578	Computational Fluid Dynamics	3
MEEN 579	Two-Phase Flow and Heat Transfer	3
MEEN 581	Energy Management and Applications	3
MEEN 589	Topics in Thermal Science and Engineering	3
Elective(s)	(Other Specialty Areas)	3-6
Degree Options (Select 3 or 6 Hours)		
ENGR 599	Engineering Project (Non Thesis Option)	3
ENGR 600	Thesis	6
TOTAL		**30**

Foundation Courses

A student lacking an undergraduate degree in engineering must show competency in the following courses:

MATH 264	Calculus I	4
MATH 265	Calculus II	4
MATH 395	Calculus III and Differential Equations	4
CHEM 112	General Chemistry Lab	1
CHEM 132	General Chemistry	3
PHYS 221/223	General Physics	4

PHYS 222/224	General Physics II	4
MEEN 300	Thermodynamics	3
MEEN 442	Heat Transfer	3

Specialty Area 2: Sustainable Systems Engineering

Track 3: Telecommunication and Computer Network Engineering

Course No.	Course Title	Credit Hours
Core Courses (Select 9 Hours)		
ENGR 500	Probability and Statistics for Engineers	3
ENGR 520	Mathematical Methods in Engineering	3
ENGR 530	Advanced Computer Applications for Engineers	3
ENGR 540	Fundamentals of Engineering Materials	3
ENGR 550	Numerical Methods for Engineering Applications	3
ENGR 560	Optimization Theory and Methods	3
Core Course (Select 3 Hours)		
ENGR 570	Engineering Management Methods	3
MBAP 538	Project Management	3
Elective Courses (Select 12 to 18 Hours)		
ELEN 405	Digital Signal Processing	3
ELEN 475	Computer Networks	3
ELEN 521	Digital Transmission and Data Communications	3
ELEN 523	Communication Network Engineering	3
ELEN 533	Information Theory	3
ELEN 535	Systems Analysis and Management	3
ELEN 588	Topics in Telecommunications and Computer Network	3
Elective(s)	(Other Specialty Areas)	3-6
Degree Options (Select 3 or 6 Hours)		
ENGR 599	Engineering Project (Non Thesis Option)	3
ENGR 600	Thesis	6
TOTAL		**30**

Foundation Courses

A student lacking an undergraduate degree in engineering must show competency in the following courses:

MATH 264	Calculus I	4
MATH 265	Calculus II	4
MATH 395	Calculus III and Differential Equations	4
CHEM 112	General Chemistry Lab	1
CHEM 132	General Chemistry	3
PHYS 221/223	General Physics	4
PHYS 222/224	General Physics II	4

Specialty Area 3: Engineering Management

Course No.	Course Title	Credit Hours
Required Core Courses (3 Hours)		
MGMT 592	Business Strategic Decision Making	3
Core Courses (Select 6 Hours)		
ENGR 500	Probability and Statistics for Engineers	3
ENGR 520	Mathematical Methods in Engineering	3
ENGR 530	Advanced Computer Applications for Engineers	3
ENGR 540	Fundamentals of Engineering Materials	3
ENGR 550	Numerical Methods for Engineering Applications	3
ENGR 560	Optimization Theory and Methods	3
Core Course (Select 3 Hours)		
ENGR 570	Engineering Management Methods	3
MBAP 538	Project Management	3
Engineering Elective Courses (Select 9 Hours)		
Elective(s)	(Other Specialty Areas)	9
Business Elective Courses (Select 6 to 9 Hours)		
MBAP 512	Managerial Economics	3
MBAP 516	Organizational Behavior and Leadership	3
MBAP 517	Operations Management	3
MBAP 519	Marketing Management	3
MBAP 523	Entrepreneurship	3
MBAP 537	Global Supply Chain Management and ERP	3
MBAP 538	Project Management	3
Engineering Project (3 Hours)		
ENGR 599	Engineering Project	3
TOTAL		**30**

Foundation Courses

Engineering students lacking an undergraduate degree in Management must show competency in the following course

MGMT 300	Principles of Management	3

COURSE DESCRIPTIONS

Core Courses *(For All Three Specialty Areas)*

ENGR 500. Probability and Statistics for Engineers (Credit, 3 hours). Probability distributions, Statistical Inferences, Regression Analysis, Multiple Regression, Hypothesis testing, Design of Experiments and Analysis of Variance, Non-parametric Statistics, Statistical Quality Control, Stochastic Processes.

ENGR 520. Mathematical Methods in Engineering. (Credit, 3 hours) This course covers a variety of topics in applied mathematics including: vector differential calculus, Green, Gauss, and Stokes theorems, orthogonal series including Fourier, Bessel and Legendre series, Sturm-Liouville problems, boundary value problems for partial differential equations, discrete and continuous Fourier transforms including the mathematics of the Fast Fourier Transform. The course will stress the application of mathematical results and methods to solve engineering problems.

ENGR 530. Advanced Computer Applications for Engineers (Credit, 3 hours). This course provides students with an in-depth look at the capabilities and limitations of computers in engineering applications. Packed with examples, it shows how to use the computer as an analytical tool in the development, testing and documentation of a structured problem.

ENGR 540. Fundamentals of Engineering Materials (Credit, 3 hours). Study of structure and composition of engineering materials in relation to the properties. Topics include atomic structure and bonding damage flaw interactions, crystallography and relationship to electrical, mechanical, thermal, optical, and magnetic properties of solid materials including metals, alloys, polymers, composites, and ceramics.

ENGR 550. Numerical Methods for Engineering Applications (Credit, 3 hours). This course covers numerical methods for solution of engineering problems; system of linear equations, ordinary differential equations (ODEs) including one-dimensional initial value problems and boundary value problems; partial differential equations (PDEs) including elliptic, parabolic and hyperbolic PDEs.

ENGR 560. Optimization Theory and Methods (Credit, 3 hours). This course introduces mathematical modeling techniques as tools that support optimization and operations research in the solution of engineering systems problems. Topics include formulation and mathematical representation of engineering systems and their solution via linear programming (LP), non-linear programming (NLP), separable programming, dynamic programming (DP) and other evolving and traditional numerical techniques. Multi-objective optimization (especially multi-objective LP) is also presented.

ENGR 570. Engineering Management (Credit 3 hours) Introduction to broad field of engineering management with specific emphasis on subjects such as project management, value engineering, constrained optimization, maintenance management, and enterprise resource planning (ERP). Students will be required to perform projects in selected areas

Specialty Area 1: Materials Science and Engineering
Track 1: Advanced Engineering Materials
Elective Courses

MEEN 430. Introduction to Finite Elements (Credit, 3 hours). Presents an introduction to the nature and capabilities of finite elements techniques, and methods in engineering science and practices. Prerequisites: MEEN 221, 227, 312, and MATH 395.

MEEN 551. Fracture Mechanics & Fatigue in Materials (Credit, 3 hours). Theory of ductile and brittle fracture, fracture mechanics and mechanism; fracture and design of components, effects of temperature; the S-N curve, cycle stress-strain, structural fracture of fatigue; effects of material variables on fracture, related topics.

MEEN 552. Corrosion Science and Engineering (Credit, 3 hours). Corrosion and degradation processes in materials, their mechanisms, theory and control of corrosion, corrosion testing and design of structural materials, current literature on oxidation behavior and corrosion.

MEEN 563. Composite Materials (Credit, 3 hours). Basic constituents of composites, and relationship between the physical parameters of each constituent, micromechanical and macromechanical analysis, and failure criteria.

MEEN 565. Characterization of Materials (Credit, 3 hours). Theory and principles of crystallography, Microstructural characterization techniques such as SEM, TEM, X-ray diffraction, microstructural analysis, fractography.

MEEN 588. Topics in Materials Science and Engineering (Credit, 3 hours). Individual or group study in one or more areas of Materials Science and Engineering or related topics.

Specialty Area 1: Materials Science and Engineering
Track 2: Electronic Materials and Processing
Elective Courses

ELEN 418. Theory and Fabrication of Solid-State Devices (Credit, 3 hours). A study of the theory and fabrication of semiconductor devices including diodes, transistors, and integrated circuits. Prerequisite: ELEN 312. ELEN 419. Integrated Circuit Design and Analysis.

ELEN 419. Integrated Circuit Analysis. (Credit, 3 hours). A study of integrated circuit technology. The physics of various devices considered along with fabrication techniques to provide a basis for circuit modeling, circuit analysis, and the comparison of devices based on speed, reliability, power handling capability, economics, etc. Large-scale integrated logic circuits and linear integrated circuit design and application will be for integrated logic circuits and linear integrated circuits. Prerequisite: ELEN 313. ELEN 418 also recommended.

ELEN 526. Solid State Physics (Credit, 3 hours). This course analyzes the nature of solids and uses principles form physics to examine and explain the characteristics of solid materials. Topics such as crystal structure, quantum mechanics, energy bands, electron transport, and conductivity will be presented.

ELEN 536. Physics of Semiconductor Devices (Credit, 3 hours). Introduction to the physical principles underlying semiconductor device operation and the application of these principles to specific devices. Emphasis will be placed on understanding device operation rather than circuit properties.

ELEN 541. Integrated Circuit Processing and Fabrication and Lab (Credit, 3 hours). This course provides students with the fundamentals needed for advanced semiconductor processing, particularly, basic processes common to all Integrated-Circuit technology and provides a base for understanding of what can and cannot be achieved through integrated- circuit fabrication.

ELEN 544. Integrated Fiber Optics (Credit, 3 hours). Propagation of waves in electric thin films and cylindrical guides. Bit limitation rate due to material dispersion and multimoding.

Step index and graded index fibers. Switching and modulation by integrated optics techniques.

ELEN 546. Very Large Scale Integration (VLSI) Technology (Credit, 3 hours). Modern VLSI technologies, MOS and Bipolar device electrical characteristics are very sensitive to structural details and hence to fabrication techniques. This course concentrates on how VLSI devices and circuits are fabricated and on what future changes are likely.

ELEN 589. Topics in Electronic Materials and Processing Engineering (Credit, 3 hours).
Individual or group study in one or more areas of Electronic Materials and Processing Engineering or related topics.

Specialty Area 2:
Sustainable Systems Engineering

Track 1: Environmental and Water Resources Engineering Elective Courses

CIEN 421. Water and Wastewater Analysis (Credit, 3 hours). Chemical kinetics and equilibrium, acid-base chemistry, oxidation reduction reactions, precipitation, dissolution and the application of the principles of gravimetric, volumetric, and colorimetric methods to the laboratory analysis of water and wastewater. Prerequisites: CIEN 325

CIEN 462. Design of Water & Sewage Treatment Plants (Credit, 3 hours). Design and operation of water and wastewater treatment systems including physical, chemical, and biological principles, and design of water and wastewater treatment plants. Prerequisites: CIEN 323 and 325.

CIEN 475. Solid/Hazardous Waste Management (Credit, 3 hours). Generation, onsite storage, collection, transfer and transport, processing and recovery, and disposal of solid/hazardous wastes. Prerequisite: CIEN 325.

CIEN 511. Solid/ Hazardous Waste Management Engineering (Credit, 3 hours).A comprehensive study of solid and hazardous waste management including identification, generation, transportation, risk assessment, and techniques and technologies for control and treatment; engineering design of control technologies and strategies for selecting them.

CIEN 512. Biological Wastewater Treatment (Credit, 3 hours). Overview of biological wastewater treatment; microbial metabolism; bacterial growth; biological treatment processes; aerobic and anaerobic suspended and attached growth treatment systems; biological nutrient removal; and design of biological unit processes.

CIEN 515. Advanced Industrial Waste Treatment (Credit, 3 hours).A comprehensive study of the industrial waste treatment processes and toxicity reduction in industrial effluents; physical, chemical, and biological treatment processes; wastewater reclamation and reuse and design of treatment systems.

CIEN 516. Atmospheric Dispersion Modeling (Credit, 3 hours). Fundamentals of air pollution meteorology and atmospheric dispersion of pollutants. Dispersion models, with emphasis on the Gaussian plume model, use of computer dispersion models to predict ambient concentrations of pollutants, regulatory aspects of modeling.

CIEN 588 Topics in Environmental Engineering (Credit, 3 hours). Individual or group study in one or more areas of environmental engineering or related topics.

Specialty Area 2:

Sustainable Systems Engineering

Track 2: Thermal Science and Engineering
Elective Courses

MEEN 421. Thermal Environmental Engineering (Credit, 3 hours). Covers air and humidity calculations, heating and cooling loads, cooling systems, physiological reactions to the environment, air distribution systems, principles of refrigeration, and cryogenic systems. Prerequisite: MEEN 301

MEEN 574. Advanced Applied Heat Transfer (Credit, 3 hours). Fundamentals of conduction, convection, and radiation heat transfer. Practical engineering applications of heat exchangers, different design approaches. Boiling and condensation, convection fouling factors, mixed mode heat transfer. Topics from current applications such as heat transfer in electronic equipment.

MEEN 578. Computational Fluid Dynamics (Credit, 3 hours). Advanced numerical method for solving Navier-Stockes equations. Numerical solutions to boundary layer problems. Solutions to potential flows. Students will be required to perform projects in selected areas.

MEEN 579. Two-Phase Flow and Heat Transfer (Credit, 3 hours). Current status of multi-phase flow and heat transfer application to design; reviews of single-phase and two-phase flow heat transfer, principles of liquid cooling of electronic devices, basic one-dimensional treatment of two-phase pressure drop flows and current state of the art in liquid-vapor phase change heat transfer.

MEEN 581 Energy Management and Applications (Cred- it, 3 hours). Application of basic principles of energy management; case studies of energy conservation opportunities; energy audits; and building load computer simulation.

MEEN 589. Topics in Thermal Science and Engineering (Credit, 3 hours). Individual or group study in one or more areas of Thermal Science and Engineering or related topics.

Specialty Area 2:

Sustainable Systems Engineering

Track 3: Telecommunication and Computer Network Engineering- Elective Courses

ELEN 405. Digital Signal Processing (Credit, 3 hours). Introductory course in digital signal processing. Topics include discrete- time description of signals, the f-transform, digital filter structures, infinite impulse response filter design techniques, finite impulse response design techniques, finite precision effects, and inverse filtering. Prerequisites: ELEN 340 and ELEN 390.

ELEN 475. Computer Networks (Credit, 3 hours). Presents the study and design of computer networks to include protocols, network interfacing, network performance, etc. Prerequisite: Senior standing or approval of instructor.

ELEN 521. Digital Transmission and Data Communication Network Engineering (Credit, 3 hours). Introduction to the

fundamentals of digital transmission technology, topics include voice digitization using PCM, DPCM techniques, low bit rate coding of speech and data, time division, frequency division and statistical multiplexing, framing, synchronization, line coding, error detection and correction, data modulation, baseboard and carrier transmission techniques, characterization of transmission media, data communication protocols and seven-layer ISO model, design, analysis, and implementation of local and wide area networks, circuit switching packet switching, contention protocols, collision detection, token passing, Ethernet, buses and rings.

ELEN 523. Communication Network Engineering (Credit, 3 hours). The design of transmission systems for voice, high-speed data, and mobile services using fiber optics, satellites, microwave, mobile radio, and cable. Emphasis will be placed on examining an application, determining traffic type and characteristics, and choosing the appropriate media and protocol to support transmission.

ELEN 533. Information theory (Credit, 3 hours). Introduction of discrete information sources and the fundamental concept of entropy and data compression codes. Introduction to application of information theory to cryptography. Introduction to Shannon's source coding theorems. An overview of digital communication systems and concept of information.

ELEN 535. Systems Analysis and Management (Credit, 3 hours). Introduces the student to basic systems analysis tools and the procedures for conducting a systems analysis. Topics will include the design of system requirements, feasibility studies and cost analysis, detailed design, implementation, system testing, and system life cycle management. The student will implement these concepts through studies and/or projects.

ELEN 588. Topics in Telecommunication and Computer Network Engineering (Credit, 3 hours). Individual or group study in one or more areas of Telecommunication and Computer Network engineering or related topics.

Specialty Area 3: Engineering Management
Engineering Elective Courses
Select any electives from Specialty Area 1 or 2.

Business Elective Courses

MBAP 512. Managerial Economics (Credit, 3 hours). This course is a combination of intermediate microeconomic theory, statistics and econometrics, and some business management. It emphasizes the use of micro-economic analysis as a practical tool for decision making in consumption, management and public policy. The economic behavior of individuals (consumers and producers) in various types of markets as well as market themselves will be studied with intensive use of graphs, computer/statistical applications and algebraic equations.

MBAP 516. Organizational Behavior and Leadership (Credit, 3 hours).A course in organization structure management process and technology as they affect human behavior, control processes, communication systems, and other dimensions of the organization. Emphasis is placed on the study of "classic" readings these fields, so that the student can understand both the state of art in theory, research, and practice, as well as gain insight into the historical development of ideas. Organization theory topics covered will be include organization structure, strategy, conflict, politics, culture and design. Organization behavior topics covered will include individual-level phenomena such as employee attitudes, motivation and behaviors, and meso-level phenomena including group and team dynamics.

MBAP 517. Operations Management (Credit, 3 hours). This course focuses on the major managerial issues in manufacturing management and the statistical/analytical tools that can be used to manage them. The major operations management issues are quality management and control, capacity management, plant location, layout and design, production planning and scheduling, inventory management, and related topics. The analytical tools covered include queuing theory, statistical quality control, linear programming, and related topics

MBAP 519. Marketing Management (Credit, 3 hours). An advanced applied course in marketing management and decision-making. This course focuses on the decisions that managers make and the tools that they use to support an effective marketing strategy. It provides a strategic way to think about the firm's products, services, and markets, including marketing strategy and implementation. Topics include the study of customer/buyer behavior, market segmentation, competitive analysis, product development and positioning, advertising and promotion, and pricing issues.

MBAP 523. Entrepreneurship (Credit, 3 hours). This course covers the entrepreneurial process from conception to birth of the new venture. It looks at both process and people involved in assessing ideas, exploiting opportunities, gathering resources and converting concepts into businesses. It explores the practical tools which students can use to further their careers in business, both in entrepreneurship and in more "traditional" corporate environments. A key aspect of the course is working in teams to write business plan for a new or dramatically expanded venture.

MBAP 537. Global Supply Chain Management and ERP (Credit, 3 hours). This course examines contemporary issues in the management and integration of raw material procurement, inventory management, and finished goods delivery. In addition, students will have hands-on experience of using ERP software such as SAP. The topics covered include planning and managing inventories, transportation, network design, and financial factors influencing supply chain decisions.

Degree Options

ENGR 599. Engineering Project (Credit, 3-15 hours). Continuation of research on Engineering Project. Satisfactory oral defense of topic is required for graduation.

ENGR 600. Thesis (Credit, 3-15 hours). Continuation of research on Thesis. Satisfactory oral defense of topic is required for graduation.