THE WILLIAM STATES LEE

COLLEGE OF ENGINEERING

APPROVALS

MEMORANDUM

TO: Dean Nancy Gutierrez, College of Liberal Arts and Sciences

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: May 6, 2009

RE: Request to clarify the "W" requirement for Physics and Engineering double majors\

The request to clarify the "W" requirement for Physics and Engineering double majors was approved by the Chair of the Undergraduate Course and Curriculum Committee on May 5, 2009. **It is approved for implementation Fall Semester 2009.**

Catalog copy:

DUAL DEGREE PROGRAMS WITH ELECTRICAL AND COMPUTER ENGINEERING

The Department of Physics and Optical Science offers two dual degree opportunities with the Department of Electrical and Computer Engineering. These dual degrees are designed to broaden and enhance the education of students in engineering degree programs. Students can obtain a B.S. Physics and B.S. Electrical Engineering dual degree or a B.S. Physics and B.S. Computer Engineering dual degree. Students completing the dual degree can complete the "W" in the major requirement by taking 3 credit hours chosen from the following engineering courses: ECGR 2155, ECGR 2156, ECGR 3155, ECGR 3156, ECGR 3253, or ECGR 3254.

B.S.E.E./B.S. IN PHYSICS

To obtain a dual B.S. degree in Electrical Engineering and Physics, an undergraduate student must complete all requirements for the B.S.E.E. degree as established by the Department of Electrical and Computer Engineering. In addition, the student must complete 12 hours of upper division physics courses specified by the Department of Physics and Optical Science. To meet the upper division physics requirements, students must complete the following courses: PHYS 3121 (Classical Mechanics), PHYS 4241 (Quantum Mechanics), and 6 elective hours chosen from a list of approved courses available from the Department of Physics and Optical Science. A B.S. in Physics under this program will be awarded at the same time as the B.S.E.E. The B.S. Physics degree will not be awarded in advance of the engineering degree.

B.S.Cp.E./B.S. IN PHYSICS

To obtain a dual B.S. degree in Computer Engineering and Physics, an undergraduate student must complete all requirements for the B.S. Cp.E. degree as established by the Department of Electrical and Computer Engineering. In addition, the student must complete 12 hours of upper division physics courses specified by the Department of Physics and Optical Science. To meet the upper division physics requirements, students must complete the following courses: PHYS 3121 (Classical Mechanics), PHYS 3141 (Introduction to Modern Physics), PHYS 4231 (Electricity and Magnetism), PHYS 4241 (Quantum Mechanics). Students must also complete MATH 2241. A B.S. in Physics under this program will be awarded at the same time as the B.S.Cp.E. The B.S. Physics degree will not be awarded in advance of the engineering degree.

DUAL DEGREE PROGRAM WITH MECHANICAL ENGINEERING

The Department of Physics and Optical Science offers a dual degree opportunity with the Department of Mechanical Engineering. The dual degree is designed to broaden and enhance the education of students in the engineering degree program. Students can obtain a B.S. Physics and B.S. Mechanical Engineering dual degree. Students completing the dual degree cam complete the “W” in the major requirements by taking 3 credit hours chosen from the following engineering courses: MEGR 3171L, MEGR 3152, or MEGR 3251.

B.S.M.E./B.S. PHYSICS

To obtain a dual B.S. degree in Mechanical Engineering and Physics, an undergraduate student must complete all requirements for the B.S.M.E. degree as established by the Department of Mechanical Engineering. In addition, the student must complete 12 hours of upper division physics courses specified by the Department of Physics and Optical Science. To meet the upper division physics requirement, students must complete the following courses: PHYS 3141 (Introduction to Modem Physics), PHYS 4231 (Electromagnetic Theory I), PHYS 4241 (Quantum Mechanics I), and 3 elective hours chosen from a list of approved courses available from the Department of Physics and Optical Science. A B.S. in Physics under this program will be awarded at the same time as the B.S.M.E. The B.S. Physics degree will not be awarded in advance of the engineering degree.

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: April 10, 2009

RE: Request to revise the course title of CEGR 6147 to Watershed Modeling

The request to revise the course title of CEGR 6147 to Watershed Modeling was approved by the Chair of the Graduate Council on March 11, 2009. **It is approved for implementation Fall Semester 2009.**

Catalog Copy

CEGR 6147. ~~**Storm Water**~~ **Watershed Modeling. (3)** Prerequisite: permission of department. Characterization of non-point source pollution; modeling of flow and pollutant transport in storm runoff. Watershed modeling in a GIS environment including applications of SWIMM, BASINS, HEC-HMS, HEC-RAS, and NRCS models. ~~; application of U.S. EPA Stormwater Management Model and U.S. Soil Conservation Service Models.~~ *(Spring ~~Alternate years~~)*

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: April 10, 2009

RE: Request to re-number CEGR 5124 to CEGR 6124

The request to re-number CEGR 5124 to CEGR 6124 was approved by the Chair of the Graduate Council on April 7, 2009. **It is approved for implementation Spring Semester 2010.**

Catalog Copy

CEGR ~~5~~6124. Masonry Design. (3) Prerequisite: permission of department. Introduction of masonry materials and systems, engineering and materials properties and testing procedures. Design of reinforced and unreinforced masonry (clay and concrete) walls, beams, and columns for vertical, wind, and seismic loads. Analysis and design of masonry structures ~~(including torsion)~~ and introduction to computer applications. Prior course work in CEGR 3225 is required. *(Spring) (Alternate years)*

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: April 9, 2009

RE: Request to establish ETGR 4100 and ETGR 4200 and to designate them as "W" and "O" courses

The request to establish ETGR 4100 and ETGR 4200 and to designate them as "W" and "O" courses was approved by the Chair of the Undergraduate Course and Curriculum Committee and the Dean of the University College on March 12, 2009. **It is approved for implementation Fall Semester 2009.**

Catalog Copy

ETGR 4100. Engineering Technology Interdisciplinary Industrial Senior Design Project I. (2) (O, W) Prerequisites for MET students: ETME 3143 and ETME 3213. Co-requisite or prerequisite for MET students: ETME 3164 or permission. Prerequisites for ELET students: Senior standing in department. Co-requisite for ELET students: ELET 4191. Prerequisites for CIET students: ETCE 4251. This is the first of a two semester sequence in senior design that utilizes industrial and university sponsored projects to expose engineering technology students in their final year of training to real world project execution and management, in addition to demonstrating abilities as developed by the coursework taken thus far. These projects are usually interdisciplinary in nature, involving students in groups that contain more than one engineering discipline. Projects are defined for the students by statements of work issued by the funding entities. In the first semester, students are exposed to proper project management and planning methodology, along with project documentation. This course meets for one (1) lecture hours and three (3) laboratory hours per week. *(Fall)*

ETGR 4200. **Engineering Technology Interdisciplinary Industrial Senior Design Project II. (2) (O, W)** Prerequisite: ETGR 4100 with a grade of C or better. Prerequisite for ELET students: ELET 4191 with a grade of C or better. This is the second of a two semester sequence in senior design that utilizes industrial and university sponsored projects. Students will incorporate Applied Project Management techniques into the capstone project identified in ETGR 4100, in addition to executing the design plans generated in ETGR 4100. This course meets for one (1) lecture hours and three (3) laboratory hours per week. *(Spring)*

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: April 3, 2009

RE: Request to correct the numbering of ECGR 8117 to ECGR 8119 and add the catalog entry for cross-listed 6000 level course, ECGR 6119

The request to correct the numbering of ECGR 8117 to ECGR 8119 and add the catalog entry for cross-listed 6000 level course, ECGR 6119 was approved by the Chair of the Graduate Council on March 2, 2009. **It is approved for implementation Fall Semester 2009.**

Catalog Copy

ECGR 8117. ~~Applied Artificial Intelligence~~ Multivariable Controls. (3) See ECGR 6117 for Course Description. Credit will not be given for ECGR 8117 where credit has been given for ECGR 6117.

ECGR 6119. Applied Artificial Intelligence. (3) The theory of machine intelligence. Computational methods for modeling machine intelligence including machine vision and automatic decision making from sensor measurements. Applications of this theory to autonomous robotic decision making such as navigation and industrial quality control.

ECGR 8119. Applied Artificial Intelligence. (3) See ECGR 6119 for Course Description. Credit will not be given for ECGR 8119 where credit has been given for ECGR 6119.

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: February 13, 2009

RE: Request to add concentrations in Electrical Engineering and Computer

The request to add concentrations in Electrical Engineering and Computer Engineering was approved by the Chair of the Undergraduate Course and Curriculum Committee on February 12, 2009. It is approved for implementation First Summer Session, 2009.

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING (B.S.E.E.) WITH A CONCENTRATION

The Department of Electrical and Computer Engineering offers eight (8) optional concentrations in Electrical Engineering for its B.S.E.E. majors. A student may choose only one area of concentration or he/she is not required to select any. Any students interested in a concentration must contact the Department with their selection prior to the first semester of their senior year. Students may select from the following concentrations:

Communications

Students must take the following prerequisite course:

ECGR 4123 Analog & Digital Communication

Students must take three courses from the following:

ECGR 3123 Data Communications & Networking

ECGR 4101 Embedded Systems

ECGR 4124 Digital Signal Processing

ECGR 4139 Digital Communication Systems

ECGR 4186 Optical Communication & Optical Signals

ECGR 4422 Random Processes & Optimum Filtering

Electromagnetics

Students must take three courses from the following:

MATH 2242 Calculus IV

ECGR 4121 Antennas

ECGR 4125 Foundation of Optical Engineering

ECGR 4261 Microwave Circuit Design I

Optical Engineering

Students must take the following prerequisite course:

ECGR 3133 Solid State Microelectronics I

Students must take three courses from the following:

ECGR 4125 Foundations of Optical Engineering

ECGR 4165 Laser Electronics I

ECGR 4186 Optical Communication & Optical Signals

ECGR 4193 Experiments in Modern Optical Engineering

ECGR 4231 Sensors and Actuators

Power Systems and Power Electronics

Students must take the following prerequisite course:

ECGR 3142 Electromagnetic Devices

Students must take the following two courses:

ECGR 4141 Power Systems Analysis I

ECGR 4142 Power Systems Analysis II

Students must choose one of the following:

ECGR 3134 Industrial Electronics

ECGR 4143 Electrical Machinery

Signal Processing

Students must take the following prerequisite course:

ECGR 4124 Digital Signal Processing

Students must take three courses from the following:

ECGR 4101 Embedded Systems

--OR--

ECGR 4146 Introduction to VHDL (but not both)

ECGR 4103 Applied Computer Graphics

ECGR 4111 Control Systems Theory I

ECGR 4122 Acoustics

ECGR 4123 Analog & Digital Communication

ECGR 4139 Digital Communication Systems

ECGR 4422 Random Processes & Optimum Filtering

Controls

Students must take the following prerequisite courses:

ECGR 3112 System Analysis II

ECGR 3142 Electromagnetic Devices

Students must take three courses from the following:

ECGR 4111 Control Theory I

ECGR 4112 Control Theory II

MATH 2164 Matrices & Linear Algebra

For complete details about the concentrations, please visit the ECE Department's website at www.ece.uncc.edu.

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING (B.S.Cp.E.) WITH A CONCENTRATION

The Department of Electrical and Computer Engineering offers three (3) optional concentrations in Computer Engineering for its B.S.Cp.E. majors. A student may choose only one area of concentration or he/she is not required to select any. Any students interested in a concentration must contact the Department with their selection prior to the first semester of their senior year. Students may select from the following concentrations:

Communications and Signal Processing

Students must take three courses from the following:

ECGR 3112 System Analysis II

ECGR 4103 Applied Computer Graphics

ECGR 4123 Analog and Digital Communication

ECGR 4125 Foundation of Optical Engineering

ECGR 4139 Digital Communication Systems

ECGR 4187 Data Communications

ECGR 4422 Random Processes and Optimum Filtering

Hardware Systems

Students must take three courses from the following:

ECGR 3121 Intro to Electromagnetic Fields

ECGR 3133 Solid State Microelectronics I

ECGR 3182 Digital Electronics

ECGR 4131 Linear Integrated Electronics

ECGR 4132 Analog Integrated Circuits Design

ECGR 4134 Solid State and Semiconductor Microelectronics

ECGR 4137 Device Electronics for Integrated Circuits

ECGR 4138 Electronic Thin Film Materials and Devices

ECGR 4182 Digital System Testing

ECGR 4188 Advanced VLSI Systems Design

ECGR 4433 VLSI Systems Design

Computer Architecture, Software, and Systems

Students must take three courses from the following:

ITCS 2214 Data Structures

ECGR 3112 System Analysis II

ECGR 4090 Computer Engineering Research Tools and Techniques

ECGR 4090 Reconfigurable Computing

ECGR 4102 Engineering Simulation

ECGR 4103 Applied Computer Graphics

ECGR 4111 Control Systems Theory I

ECGR 4112 Control Systems Theory II

ECGR 4161 Introduction to Robotics

ECGR 4181 Computer Arithmetic

For complete details about the concentrations, please visit the ECE Department's website at www.ece.uncc.edu.

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: February 16, 2009

RE: Request to revise the course description for ENGR 3295

The request to revise the course description for ENGR 3295 was approved by the Chair of the Undergraduate Course and Curriculum Committee on February 12, 2009. **It is approved for implementation First Summer Session, 2009.**

Catalog Copy

ENGR 3295. Multidisciplinary Professional Development. (1) Prerequisite: Senior standing or Junior standing per departmental requirements. A series of multidisciplinary and disciplinary seminars and activities designed to introduce students to basic concepts of professionalism in engineering. Topics include global, societal, and contemporary issues of current interest such as – leadership, entrepreneurship, ethics, cultural diversity, and professional licensure ~~career planning~~. (Pass/No Credit)

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: February 16, 2009

RE: Request to establish ETME 4245 (Energy Management)

The request to establish ETME 4245 (Energy Management) was approved by the Chair of the Undergraduate Course and Curriculum Committee on February 12, 2009. **It is approved for implementation First Summer Session, 2009.**

Catalog Copy

ETME 4245. Energy Management. (3) Prerequisite: a working knowledge of engineering economics and thermodynamics. Study of the understanding and implementation of energy management techniques. Emphasis is on energy efficiency applications in homes, businesses, large buildings and industry. Topics include energy auditing, energy management, energy cost analysis, energy & electric rate structures, lighting, HVAC systems, motors & drivers, boilers and steam systems, cogeneration, commercial and industrial applications and alternative energy sources. *(On demand)*

MEMORANDUM

TO: Dean Robert Johnson, College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: February 13, 2009

RE: Request to revise the four-year Electrical Engineering Technology Undergraduate Curriculum

The request to revise the four-year Electrical Engineering Technology Undergraduate Curriculum was approved by the chair of the Undergraduate Course and Curriculum Committee on December 1, 2008. **It is approved for implementation First Summer Session, 2009**

Proposed Catalog Copy.

(New course)

ELET 1101. Simulation and Schematic Capture. (1) This course introduces computer-aided design and engineering (CAD/CAE) with an emphasis on applications in the electronics field. Topics include electronics industry standards (symbols, schematic diagrams, and layouts); drawing electronic schematics; simulating electronic circuits and printed circuit board layout of electronic circuits. Techniques for capturing CAD/CAE output to include with reports are also covered. This course meets for three (3) lab hours per week in a computer lab. *(Fall)*

~~ETEE 1123~~**. ELET 1111. DC Circuit~~s~~. ~~Analysis~~ (3)** Corequisites: ELET 1101, ELET 1111L. Prerequisite or Corequisite: MATH 1100. This course is an introduction to electric circuits with an emphasis on DC circuit analysis and design. Topics include fundamental electrical and magnetic principles, circuit analysis laws and theorems, and component characteristics and behaviors. This course meets for three (3) lecture hours per week. *(Fall)*

ELET 1111L. DC Circuits Laboratory. (1) Corequisites: ELET 1101 and ELET 1111. This laboratory course supports concepts and practices covered in ELET 1111. This course meets for three (3) laboratory hours per week. *(Fall)*

ELET 1212. AC Circuits. (3) Prerequisites: ELET 1101, ELET 1111 and ELET 1111L with a grade of C or better. Corequisites: ELET 1212L and MATH 1103. This course is the continuation of an introduction to electric circuits with an emphasis on AC circuit analysis and design. Topics include application of electrical and magnetic principles, analysis laws and theorems in AC circuits, an introduction to frequency response and circuit behaviors under AC excitation. This course meets for three (3) lecture hours per week. *(Spring)*

ELET 1212L. AC Circuits Laboratory. (1) Prerequisites: ELET 1111 and ELET 1111L with a grade of C or better. Corequisite: ELET 1212. This laboratory course supports concepts and practices covered in ELET 1212. This course meets for three (3) laboratory hours per week. *(Spring)*

ELET 1231. Digital Circuits. (3) Prerequisites: ELET 1101, ELET 1111 and ELET 1111L with a grade of C or better. Corequisites: ELET 1231L. This course covers fundamental digital concepts including number systems, logic gates, Boolean algebra, Karnaugh Maps, and combinational logic. Topics include combinational digital circuit design and analysis, minimization methods, and hardware descriptor languages such as VHDL. This course meets for three (3) lecture hours per week. *(Spring)*

ELET 1231L. Digital Circuits Laboratory. (1) Prerequisites: ELET 1111 and ELET 1111L with a grade of C or better. Corequisite: ELET 1231. This laboratory course supports concepts and practices covered in ELET 1231. This course meets for three (3) laboratory hours per week. *(Spring)*

ELET 2121. Electronics I. (3) Prerequisites: ELET 1212 and ELET 1212L with a grade of C or better, MATH 1103. Corequisite: ELET 2121L. This course is an introduction to semiconductor electronic devices and circuits. Topics include semiconductor diodes, bipolar junction transistors (BJTs), field-effect transistors (FETs), ideal operational amplifiers and the application of these solid state devices in basic circuits and systems. This course meets for three (3) lecture hours per week. *(Fall)*

ELET 2121L. Electronics I Laboratory. (1) Prerequisites: ELET 1212 and ELET 1212L with a grade of C or better. Corequisite: ELET 2121. This laboratory course supports concepts and practices covered in ELET 2121. This course meets for three (3) laboratory hours per week. *(Fall)*

ELET 2141. Introduction to Power Systems (3) Prerequisites: ELET 1212, ELET 1212L, and MATH 1103. This course is an introduction to electromagnetic fundamentals, power generation and distribution, ac and dc machines. This course meets for three (3) lecture hours per week. *(Fall)*

ELET 2201. C Programming. (3) This course is an introduction to the C programming language with an emphasis on applications in Electrical Engineering Technology. This course meets for three (3) lecture hours per week. *(Spring)*

ELET 2231. Microprocessor Fundamentals. (3) Prerequisite: ELET 1231. Corequisite: ELET 2201. This course covers application and design assembly and C language programming for AVR microprocessors. Topics include system timing, bus cycles, interrupts, stacks and subroutines. Upon completion, students should be able to design, program, verify, analyze, and troubleshoot AVR assembly and C language programs. This course meets for three (3) lecture hours per week. *(Spring)*

ELET 2241. Instrumentation and Controls. (3) Prerequisites: ELET 1212, ELET 1212L, and MATH 1103. Corequisite: ELET 2241L. This course is an introduction to instrumentation for measurement and control of physical variables, with an emphasis on electronic systems. Topics include a review of basic circuit analysis, electrical instruments, sensors and measurement principles and a survey of automatic controls from a systems point of view. This course is cross-listed as ETME 3163 and meets for three (3) lecture hours per week. *(Spring)*

ELET 2241L. Instrumentation Laboratory. (1) Prerequisites: ELET 1212 and ELET 1212L. Corequisite: ELET 2241. This laboratory course supports concepts and practices covered in ELET 2241. This course is cross-listed as ETME 3251 and meets for three (3) laboratory hours per week. *(Spring)*

ELET 3113. Network Analysis. (3) Prerequisites: ELET 1212 and ELET 1212L and with a grade of C or better, MATH 1121, and junior standing in department. This course is an introduction to frequency domain analysis through Laplace Transforms and Fourier Analysis. Topics include a review of circuit analysis fundamentals in the time domain, circuit transformations, waveform analysis and synthesis and first order natural and forced response with extensive utilization of circuit simulation software. This course meets for three (3) lecture hours per week. *(Fall) (Internet)*

ELET 3132. Digital Systems. (3) Prerequisites: ELET 1231 and ELET 1231L with a grade of C or better and junior standing in department. This course covers the design and implementation of digital systems. Topics include combinational and sequential digital circuits, minimization methods, state machine design and state assignment techniques, hardware descriptor languages such as VHDL, circuit implementation using MSI integrated circuits and programmable logic devices. This course meets for three (3) lecture hours per week. *(Fall)(Internet)*

ELET 3132L. Digital Systems Laboratory. (1) (W) Prerequisites: ELET 1231 and ELET 1231L with a grade of C or better and junior standing in department. Corequisite: ELET 3132 or permission of the department. This laboratory course supports concepts and practices covered in ELET 3132. This course meets for three (3) laboratory hours per week. *(Fall, Summer)*

ELET 3222. Electronics II. (3) Prerequisites: ELET 2121 and ELET 2121L with a grade of C or better and junior standing in department. This course is a continuation of the study of solid state devices begun in ELET 2121. Topics include frequency response of single and multistage amplifiers, feedback and stability, linear and nonlinear operational amplifier circuits, and CMOS and BiCMOS circuits with extensive utilization of circuit simulation software. This course meets for three (3) lecture hours per week. *(Spring) (Internet)*

ELET 3222L. Electronics II Laboratory. (1) (W) Prerequisites: ELET 2121 and ELET 2121L with a grade of C or better and junior standing in department. Corequisite: ELET 3222 or permission of the department. This laboratory course supports concepts and practices covered in ELET 3222. This course meets for three (3) laboratory hours per week. *(Spring, Summer)*

ELET 3232. Microcontroller Systems. (3) Prerequisites: ELET 2201 and ELET 2231. This course covers application and design of ARM (Advanced RISC Machine) systems. Topics include assembly and C language programming and an introduction to the control and interfacing of ARM based systems. Upon completion, students should be able to design, construct, program, verify, analyze and troubleshoot ARM assembly and C language programs and supporting hardware. This course meets for three (3) lecture hours per week. *(Spring) (Internet)*

ELET 4133. Embedded Systems. (3) Prerequisites: ELET 2231 and ELET 3132. This course covers the external characteristics of digital and analog integrated circuits and their applications when interfaced to embedded digital systems. Design constraints and considerations due to device limitations and device selection based upon application requirements will be discussed. Upon completion, students should be able to design, program, verify, analyze, and troubleshoot hardware and software in embedded systems. This course meets for three (3) lecture hours per week. *(On demand) (Internet)*

ELET 4142. Power Electronics/Networks. (3) Prerequisites: ELET 2141, ELET 3222 and ELET 3222L. This course is an introduction to power electronic devices in electrical systems, including their characteristics, operation and application. It also introduces topics on transmission of electric power with emphasis on modeling of power network components and systems, power flow studies and calculations. This course meets for three (3) lecture hours per week. *(Fall) (Internet)*

ELET 4151. Communication Systems. (3) Prerequisites: ELET 3222, ELET 3222L, and ETGR 3171. This course covers basic principles and concepts underlying modern communication systems. Topics include systems, signals, modulations (AM, FM, PM, FSK, PSK, QAM, PCM), transmission, reception, cellular, caller ID, and networks. This course meets for three (3) lecture hours per week. *(Fall) (Internet)*

ELET 4151L. Communication Systems Laboratory. (1) (W) Prerequisites: ELET 3222, ELET 3222L, and ETGR 3171. Corequisite: ELET 4151 or permission of the department. This laboratory course supports concepts and practices covered in ELET 4151. This course meets for three (3) laboratory hours per week. *(Fall, Summer)*

ELET 4152. Digital Signal Processing. (3) Prerequisite: ELET 3113. Discrete-time signals; discrete-time systems; Linear constant-coefficient difference equations; Periodic sampling; reconstruction from samples; changing the sampling rate; the z-transform; z-transform properties; transform analysis of linear time-invariant systems; digital filter design techniques; discrete Fourier Transform and the FFT algorithm. This course meets for three (3) lecture hours per week. *(On demand) (Internet)*

ELET 4191. Applied Project Management. (2) Prerequisite: MATH 1100 and senior standing in department. Corequisite: ELET 4192. Statement of work, activity decisions, timelines, scheduling, and resource allocation methods. Techniques will be appropriate for large and small projects within commercial, academic, or non-profit organizations. This course meets for two (2) lecture hours per week. *(Fall) (Internet)*

ELET 4192. Senior Project I. (2) (W) Prerequisite: Senior standing in department. Corequisite: ELET 4191. This is the first of a two semester sequence in senior design. Students will utilize previous coursework to creatively investigate and produce solutions for a comprehensive practical engineering technology project. This course meets for two (2) lecture hours per week. *Graded on a Pass/No Credit basis. (Fall) (Internet)*

ELET 4223. Active Filters. (3) Prerequisites: ELET 3222 and ETGR 3171. This course involves the design, analysis, simulation and implementation of composite, cascaded and summation filters. Topics include bilinear transfer functions; cascade design with first-order circuits; biquad circuits; Butterworth lowpass circuits; Butterworth bandpass circuits; the Chebyshev response; sensitivity; frequency transformations; highpass and band-elimination filters. This course meets for three (3) lecture hours per week. *(Spring) (Internet)*

ELET 4242. Control Systems. (3) Prerequisites: ELET 3113 and ETGR 3171. Automatic control systems concepts, system modeling, control system components, state space model, transfer function model, time responses, poles and zeros, closed loop, reduction of multiple subsystems, stability analysis, Routh-Hurwitz, performance analysis, design techniques, root locus, Bode, Nyquist, PID, and MATLAB control tool box. This course meets for three (3) lecture hours per week. *(Spring) (Internet)*

ELET 4293. Senior Project II. (2) (W) (O) Prerequisites: ELET 4191 with a grade of C or better and a passing grade in ELET 4192. This is the second of a two semester sequence in senior design. Students will incorporate Applied Project Management techniques into the capstone project identified in ELET 4192 to finalize project analysis, development and implementation. This course meets for two (2) lecture hours per week. *(Spring, Summer)*

Other Catalog Copy Changes

Proposed changes and additions to catalog copy, which will reflect curriculum outlines, course requirements, and program requirements, are as follows:

- ***Current catalog copy from 2007-2009 online catalog:***

The department offers curricula leading to the Bachelor of Science in Construction Management (BSCM) and the Bachelor of Science in Engineering Technology (BSET) degrees. In addition to the BSCM, four disciplines of study are available in Engineering Technology: Civil Engineering Technology (with emphases in General Civil Engineering Technology or Construction Engineering Technology); Electrical Engineering Technology (with emphases in Electronics Engineering Technology or Computer Engineering Technology); Fire Safety Engineering Technology; and Mechanical Engineering Technology.

Revised catalog copy:

The department offers curricula leading to the Bachelor of Science in Construction Management (BSCM) and the Bachelor of Science in Engineering Technology (BSET) degrees. In addition to the BSCM, four disciplines of study are available in Engineering Technology: Civil Engineering Technology (with emphases in General Civil or Construction Technology); Electrical Engineering Technology; Fire Safety Engineering Technology; and Mechanical Engineering Technology.

· ***Current catalog copy from 2007-2009 online catalog:***

Disciplines of study in Engineering Technology at UNC Charlotte include: […]

• **Electrical Engineering Technology**, (tracks in Electronics and Computers) which includes programming, AC/DC circuits, power systems, digital systems, electronics drafting, computer networks, microcomputer interfacing, solid-state electronics, integrated circuits, linear networks, communications and fiber optics, and control systems.

Revised catalog copy:

Disciplines of study in Engineering Technology at UNC Charlotte include: […]

• **Electrical Engineering Technology**, which includes programming, AC/DC circuits, digital circuits, microprocessors and microcontrollers, solid-state electronics, integrated circuits, analog and digital systems, linear and nonlinear networks, power systems, communications, and control systems.

· ***Current catalog copy from 2007-2009 online catalog:***

Discipline Specific Prerequisites:
Electrical
• Electrical Drafting
• Computer Programming
(high level language: e.g., BASIC, FORTRAN, PASCAL, C, C++)
• D.C. Circuits
• A.C. Circuits
• Digital Circuits
• Semiconductor Circuits
• Communications, Electronics, Control Systems, or Microcomputers

Revised catalog copy:

Discipline Specific Prerequisites:
Electrical

• DC Circuits and DC Circuits Laboratory
• AC Circuits and AC Circuits Laboratory
• Circuit Simulation
• Digital Circuits and Digital Circuits Laboratory
• Electronic Devices and Electronics Laboratory

• Power Systems and Machines

• Microprocessors

• Instrumentation or Program Logic Controllers and associated laboratory

• C Programming

· ***Revised catalog copy:***

CURRICULUM OUTLINE:
ELECTRICAL ENGINEERING TECHNOLOGY PROGRAM

Freshman Year			
Fall Semester		**Spring Semester**	
Course	**Credit**	**Course**	**Credit**
ENGL 1101 English Composition	3	ENGL 1102 Writing in the Academic Community **	3
MATH 1100 College Algebra & Probability[1]	3	MATH 1103 Precalculus [1]	3
ELET 1101 Simulation and Schematic Capture	1	ELET 1231 Digital Circuits	3
ELET 1111 DC Circuits	3	ELET 1231L Digital Circuits Laboratory	1
ELET 1111L DC Circuits Laboratory	1	ELET 1212 AC Circuits	3
ETGR 1100 Engineering Computer Apps	3	ELET 1212L AC Circuits Laboratory	1
ETGR 1201 Intro to ET	2	Social Science Elective	3
TOTAL	**16**		**17**

Sophomore Year			
Fall Semester		**Spring Semester**	
Course	**Credit**	**Course**	**Credit**
STAT 1220 Elements of Statistics	3	MATH 1121 Calculus (ET)	3
PHYS 1101 Physics I	3	PHYS 1102 Physics II	3
PHYS 1101L Physics I Lab	1	PHYS 1102L Physics II Lab	1
ELET 2121 Electronics I	3	ELET 2231 Microprocessor Fundamentals	3
ELET 2121L Electronics I Laboratory	1	ELET 2201 C Programming	3
		ELET 2241 Instrumentation	3
ELET 2141 Intro Power Systems	3	ELET 2241L Instrumentation Laboratory	1
TOTAL	**14**		**17**

Junior Year			
Fall Semester		**Spring Semester**	
Course	**Credit**	**Course**	**Credit**
CHEM 1251 Principles of Chemistry[4]	3	ELET 3222 Electronics II	3
ELET 3132 Digital Systems	3	ELET 3222L Electronics II Laboratory (W)	1

ELET 3132L Digital Systems Lab (W)	1	ETGR 3222 Engineering Economics	3
ELET 3113 Network Analysis	3	ELET 3232 Microcontroller Systems	3
ETGR 3071 ET Professional Seminar (W)	1	ETGR2122 Technical Programming	3
ETGR 3171 Engineering Analysis	3	Directed Elective[4]	3
Directed Elective[2]	3		
TOTAL	**17**		**16**

Senior Year

Fall Semester		**Spring Semester**	
Course	**Credit**	**Course**	**Credit**
ELET 4142 Power Electronics/ Networks	3	ELET 4223 Active Filters	3
ELET 4151 Communication Systems	3	ELET 4242 Control Systems	3
ELET 4151L Communication Systems Laboratory (W)	1	ELET 4293 Senior Project II	2
ELET 4191 Applied Project Management	2	Major Elective[3]	3
ELET 4192 Senior Project I (W)	2		
Major Elective[3]	3	Directed Elective[2]	3
Directed Elective[4]	3		
TOTAL	**17**		**14**

Total Credit Hours = 128

ELET Curriculum Outline Footnotes:

(1) Course selected based on Math Placement Test.

(2) Directed electives may be major field courses or general education courses. They are chosen jointly by student and advisor to ensure that all graduation requirements are met. Non AAS degreed students must satisfy University and ELET general education requirements. AAS degreed students must satisfy ELET general education requirements.

(3) Major elective courses are approved by the Department as major electives for the respective program. A list is maintained in and published by the Department.
(4)Transfer students with an AAS may have completed differing science courses at the community college. Generally, AAS transfer students entering the Mechanical or Electrical ET programs will take Chemistry in the junior year at UNC Charlotte; however, the following chart will provide additional guidance for fulfilling the science requirement at UNC Charlotte:

Mechanical & Electrical ET Transfer Students	**Shall Take at UNC Charlotte:**

with an AAS Degree who have previously taken:	
2 semesters of physics and no chemistry	CHEM 1251
1 semester of physics and 1 semester of chemistry	PHYS 1102 with lab
2 semesters of physics and 1 semester of chemistry	GEOL 1200, BIOL 1110, PHYS 1130, or CHEM 1252

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: December 10, 2008

RE: Request to establish minors in Electrical Engineering and in Computer Engineering

The request to establish minors in Electrical Engineering and in Computer Engineering was approved by the chair of the Undergraduate Course and Curriculum Committee on November 26, 2008 for implementation First Summer Session, 2009.

Catalog Copy:

Minor in Computer Engineering

Prerequisites

The minor assumes that students will have a background in mathematics that is covered in the first year of the ECGR curriculum. In mathematics, this would cover Calculus (MATH 1120 or MATH 1121 or MATH 1241). The totality of such courses is 3 or more credit hours.

The minor in Computer Engineering consists of 15 additional credit hours and requires the following:

Required Courses (12 credits)

ECGR 2103. Computer Utilization in C++. (3)

ECGR 2181. Logic System Design I. (3)

ECGR 3181. Logic System Design II. (3)

ECGR 3183. Computer Organization. (3)

Required Elective – at least ONE of the following courses (3 credits)

ECGR 4101. Embedded Systems. (3)

ECGR 4146. Introduction to VHDL. (3)

ECGR 4181. Computer Architecture. (3)

ECGR 4182. Digital System Testing. (3)

ECGR 4433. VLSI Systems Design. (3)

The student must achieve a minimum grade point average of 2.0 in all of these courses, and this minor is not available for a student who has a major in with Electrical Engineering or Computer Engineering.

Minor in Electrical Engineering

Prerequisites

The minor assumes that students will have a background in mathematics and physics equivalent to that covered in the first two years of the ECGR curriculum. In mathematics, this would cover calculus (MATH 1241, MATH 1242) and differential equations (MATH 1271). Knowledge of linear algebra is also recommended. Physics requirements are PHYS 2101, PHYS 2101L, and PHYS 2102. The totality of such courses is 16 credit hours.

A minor in Electrical Engineering consists of 18 additional credit hours and requires the following:

Required Courses (9 credits)

ECGR 2111. Network Theory I. (3)

ECGR 2112. Network Theory II. (3)

ECGR 3131. Fundamentals of Electronics and Semiconductors. (3)

Required Elective at least ONE of the following courses (3 credits)

ECGR 3111 Signals and Systems. (3)

ECGR 3121. Introduction to Electromagnetic Fields. (3)

If both ECGR 3111 and ECGR 3121 are taken, one of these courses will count as 3 credits toward the free elective course requirements.

Free Elective Courses (6 credits)

Students should choose 6 credits from 3000 and/or 4000-level ECGR courses. All prerequisites for such elective courses must be satisfied.

The student must achieve a minimum grade point average of 2.0 in all of these courses, and this minor is not available for a student who has a major in either Electrical Engineering or Computer Engineering.

MEMORANDUM

TO: Dean Robert Johnson, College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: January 6, 2009

RE: Request to change the course prerequisite for ECGR 5124

The request to change the course prerequisite for ECGR 5124 was approved by the chair of the Graduate Council on December 4, 2008. **It is approved for implementation First Summer Session, 2009**

Catalog Copy

ECGR 5124. Digital Signal Processing. (3) Prerequisite: ECGR 3111 ~~3112~~ or equivalent. Sampling and signal recovery in linear systems; analysis of sampled systems; discrete and fast Fourier transforms; z-transform; discrete convolution; design of digital FIR and IIR filters. Credit will not be given for ECGR 5124 where credit has been given for ECGR 4124.

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: December 11, 2008

RE: Request to restrict upper division courses (3000 level and above) to Engineering majors and minors

The request to restrict upper division courses (3000 level and above) to Engineering majors and minors was approved by the chair of the Undergraduate Course and Curriculum Committee on December 1, 2008 for implementation First Summer Session, 2009.

Catalog Copy:

Upper division courses (3000 level and above) used to satisfy degree requirements within the College of Engineering are restricted to majors and minors of the College of Engineering. Students enrolling in these classes must meet the prerequisite requirements for enrollment.

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: December 10, 2008

RE: Request to change the course title and edit the description of ECGR 4185

The request to change the course title and edit the description of ECGR 4185 was approved by the chair of the Undergraduate Course and Curriculum Committee on November 24, 2008 for implementation First Summer Session, 2009.

Catalog Copy:

ECGR 4185. ~~**Advanced Electromagnetic Field Theory**~~**. Electromagnetic Optics. (3)** Crosslisted as ECGR 5123. Prerequisites: ECGR 3122 or permission of the department. This course includes topics of electromagnetic wave in optical devices and optical systems. Electromagnetic wave propagation in dielectric media: optical waveguide, periodic structure, multi-layer dielectric, photonic crystals, anisotropic, and nonlinear materials.

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: December 10, 2008

RE: Request to change the prerequisite for ECGR 4165

The request to change the prerequisite for ECGR 4165 was approved by the chair of the Undergraduate Course and Curriculum Committee on November 24, 2008 for implementation First Summer Session, 2009.

Catalog Copy:

ECGR 4165. Laser Electronics I. (2) Crosslisted as ECGR 5165. Prerequisites: ~~ECGR 3122~~ ECGR 3121 and PHYS 3141, or permission of the Department. Basic principles of quantum electronics, interaction of light with atoms, properties of laser light, and laser applications. Electromagnetic aspects of lasers, Maxwell's Equations and beam, ray optics, matrix methods for the analysis and synthesis of optical systems. Laser resonator design, oscillation modes, mode frequency and stability.

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: December 10, 2008

RE: Request to revise the course description for ETGR 3272

The request to revise the course description for ETGR 3272 was approved by the chair of the Undergraduate Course and Curriculum Committee on November 11, 2008 for implementation First Summer Session, 2009.

Catalog Copy:

ETGR 3272. Applied Numerical Methods. (3) Prerequisites: ETGR 2122 ~~or a course in programming using a higher level language~~, and ETGR 3171. This course is designed to familiarize students with numerical methods for the solution of engineering problems using modern digital computer methods. This course will emphasize applying these techniques to both Mechanical and Civil Engineering Technology problems. ~~Emphasis on applications to civil and mechanical engineering technology, using both commercial and student written programs~~. This course will expose the student to problem solution techniques using commercially available tools, along with developing the student's ability to construct specialty algorithms within the framework of these tools. *(Fall, Summer)*

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: October 27, 2008

RE: Request to change the prerequisite for ECGR 5124

The request to change the prerequisite for ECGR 5124 was approved by the Chair of the Graduate Council on October 8, 2008 for implementation Spring Semester 2009.

Catalog Copy:

ECGR 5124. Digital Signal Processing. (3) Prerequisite: ECGR ~~3112~~ **3111** or equivalent. Sampling and signal recovery in linear systems; analysis of sampled

systems; discrete and fast Fourier transforms; z-transform; discrete convolution; design of digital FIR and IIR filters. Credit will not be given for ECGR 5124 where credit has been given for ECGR 4124. *(Spring)*

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: August 25, 2008

RE: Request to establish ETCE 1104 (Civil/Construction CAD Applications)

The request to establish ETCE 1104 (Civil/Construction CAD Applications) was approved by the Chair of the Undergraduate Course and Curriculum Committee on August 22, 2008 for implementation Spring Semester 2009.

Catalog Copy:

ETCE 1104. Civil/Construction CAD Applications. (2) Prerequisite: ETGR 1103 and civil engineering technology or construction management major standing or permission of the department. This course introduces students to civil and construction applications of AutoCAD Land Desktop and/or other similar civil engineering survey and design oriented CAD applications. One hour of lecture and three hours of laboratory per week. *(Spring)*

Construction Management Curriculum

Freshman Year			
Fall Semester		**Spring Semester**	
Course	**Cred**	**Course**	**Cred**
ENGL 1101 English Comp or ENGL 1103 Accelerated College Writing & Rhetoric	3	CMET 1680 Professional Dev I	1
ETCE 1121 Construction Methods	3	ENGL 1102 Writing in Academic Community or Writing Elective**	3
ETGR 1100 Eng Tech Comp Apps****	3	ETCE 1211/1211L Surveying I	3
ETGR 1103 Technical Drawing I	2	ETCE 1222/1222L Constr Materials	3
ETGR 1201 Intro to Eng Technology	2	~~ETGR 1104 Technical Drawing II~~ ETCE 1104-Civil/Construction CAD Applications	2
MATH 1100, 1103, or 1121	3	MATH 1103, 1121 or Free Elective***	3
TOTAL	**16**		**15**

Civil Engineering Technology curriculum

Freshman Year			
Fall Semester		**Spring Semester**	
Course	**Cred**	**Course**	**Cred**
ENGL 1101 English Composition	3	CMET 1680 Professional Development I	1
ENGL 1101 English Comp –**OR-** - ENGL 1103 Accelerated College Writing & Rhetoric	3	ENGL 1102 Writing in the Academic Community –OR— Writing Elective**	3
ETGR 1100 Engineering Computer Apps	3	ETCE 1211/1211L Surveying I	3
ETGR 1103 Technical Drawing I	2	ETCE 1222/1222L Construction Materials	3
ETGR 1201 Intro to ET	2	~~ETGR 1104 Technical Drawing II~~ ETCE 1104-Civil/Construction	2

		CAD Applications	
MATH 1100 College Algebra & Probability	3	MATH 1103 Precalc Math for Sci & Engr	3
TOTAL	**16**		**15**

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: May 21, 2008

RE: Request to establish MEGR 6000 & MEGR 8000

The request to establish MEGR 6000 & MEGR 8000 was approved by the Chair of the Graduate Council on May 12, 2008 for implementation Spring Semester 2009.

Catalog Copy:

MEGR 6000. Research Seminar. (1) Presentations on the current research in Mechanical Engineering, Engineering Science, and related fields. May be repeated for credit. *(Fall, Spring)*

MEGR 8000. Research Seminar. (1) Presentations on the current research in Mechanical Engineering, Engineering Science, and related fields. Required for all doctoral students in the MEES program. May be repeated for credit. *(Fall, Spring)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: March 12, 2008

RE: Request to remove cross listed courses linked between ECE and ME Departments and revise prerequisites

The request to remove cross listed courses linked between ECE and ME Departments and revise prerequisites was approved by the chair of the Undergraduate Course and Curriculum Committee on March 11, 2008 for implementation Fall Semester 2008.

Catalog Copy:

ECGR 4161. Introduction to Robotics. (3) ~~Crosslisted as MEGR 4127.~~ Prerequisite: ~~ECGR 2103~~ Senior standing. Modeling of industrial robots including homogeneous transformations, kinematics, velocities, static forces, dynamics, computer animation of dynamic models, motion trajectory planning, and introduction to vision, sensors, and actuators.

MEGR 4127. Introduction to Robotics. (3) ~~Crosslisted as ECGR 4161~~. Prerequisites: ~~ECGR 3101, or~~ senior standing in ME ~~or EE~~ Department~~s~~. Modeling of industrial robots, homogeneous transformations, static forces, kinematics, velocities, dynamics, computer animation of dynamic models, motion trajectory planning, and introduction to vision, sensors and actuators. (Technical Elective)

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: March 12, 2008

RE: Request to revise the catalog copy for ECGR 3695

The request to revise the catalog copy for ECGR 3695 was approved by the chair of the Undergraduate Course and Curriculum Committee on March 11, 2008 for implementation Fall Semester 2008.

Catalog Copy:

ECGR 3695. Electrical Engineering Cooperative Education Seminar.
(1) Prerequisites: ENGR 3590 and permission of the ECE Department's co-op advisor. Required ~~of Co-op~~ for co-op students during semesters immediately following each work assignment for presentation of engineering reports on work done the prior semester. Satisfactory/Unsatisfactory grading is used. May be repeated for credit**.** ~~This program is coordinated by the University Career Center.~~

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: March 12, 2008

RE: Request to change the course sequence and catalog copy for Civil Engineering Technology and Construction Management curriculums

The request to change the course sequence and catalog copy for Civil Engineering Technology and Construction Management curriculums was approved by the chair of the Undergraduate Course and Curriculum Committee on March 11, 2008 for implementation Fall Semester 2008.

Catalog Copy:

Senior Year			
Fall Semester		**Spring Semester**	
Course	**Cred**	**Course**	**Cred**
BLAW 3150 Business Law I****	3	CMET 4228 Constr Office Ops	2
CMET 4125 Constr Codes & Docs	2	CMET 4272 Constr Capstone Project (W,O)	2
ETCE 4126 Project Scheduling & Ctrl	3	CMET 4680 Prof Development IV	1
ETCE 4126L Constr Practices Lab (W)	1	~~ETCE 4251 Highway Design & Constr~~	~~3~~
ETCE4251Highway Design & Constr	**3**	MGMT 3140 Mgmt & Org Behavior****	3
Directed Electives^(1)	**3**	Core Elective^^ (Technical or Constr B&M)	3
		Directed Elective^(2)	6
TOTAL	**15**		**17**

Senior Year			
Fall Semester		**Spring Semester**	
Course	**Cred**	**Course**	**Cred**
CHEM 1111, 1251 or GEOL 1200	3	ETCE 4143 Water & Wastewater Systems	3
CHEM 1111L, 1251L, or GEOL 1200L	1	ETCE 4266 Reinforced Concrete Design	3
ETCE 4251 Highway Design & Construction	3	ETCE 4272 Capstone Project (W,O)	2
ETCE 4165 Structural Steel Design	3	CMET 4680 Professional Development IV	1
Directed Elective***	3	Directed Elective***	3
Major Elective****	3	Major Elective****	3
Major Elective Lab (W)****	1		
TOTAL	**17**		**15**

ETCE 4143. Water and Wastewater Systems. (3) Prerequisite: ETCE 3242 and CHEM 1111 or CHEM 1251. Study of water supply, treatment, and distribution and liquidwaste disposal systems. *(~~Fall~~ Spring)*

ETCE 4251. Highway Design and Construction. (3) Prerequisite: ETCE 2112 or AAS degree. Introduction to highway planning, economic considerations, and traffic engineering. Design and construction of modern highways including grade separations and interchanges. *(~~Spring~~ Fall)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: March 11, 2008

RE: Request to change the prerequisites for MEGR 3111, 3152, & 3282

The request to change the prerequisites for MEGR 3111, 3152, & 3282 was approved by the chair of the Undergraduate Course and Curriculum Committee on March 11, 2008 for implementation Fall Semester 2008.

Catalog Copy:

MEGR 3111. Thermodynamics I. (3) Prerequisite: MATH 2171 with a grade of C or better. ~~Corequisite: MEGR 3121~~. First and second laws of thermodynamics. Work and heat carnot cycle. Ideal and real gases. Non-reactive mixture of gases. Availability and irreversibility.

MEGR 3152. Mechanics and Materials Laboratory. (2) (W) Prerequisites: MEGR 2144, **MEGR 3121,** MEGR 3161 and MEGR 3171L, all with a grade of C or better. ~~Corequisite: MEGR 3122.~~ Laboratory experiments related to the areas of mechanics and materials engineering. Three hours of laboratory work per week.

MEGR 3282. Statistical Process Control and Metrology. (3) ~~Prerequisite: MEGR 3171.~~ **Prerequisite: MEGR 2180 with a grade of C or better.** Introduction to metrology. Measurement of size, form and surface texture. Introduction to quality control, control charts for attributes and variables, acceptance sampling. Process capability estimation and process control. (Technical Elective)

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: March 11, 2008

RE: Request to change the prerequisites for ETCE 3123, ETCE 4126, ETCE 2410, and ETGR 3171

The request to change the prerequisites for ETCE 3123, ETCE 4126, ETCE 2410, and ETGR 3171 was approved by the chair of the Undergraduate Course and Curriculum Committee on March 11, 2008 for implementation Fall Semester 2008.

Catalog Copy:

ETCE 2410. Introduction to Environmental Engineering Technology. (3) Prerequisites: MATH 1103, ETGR ~~1201~~ **2101**. This course is designed to serve as an introduction to environmental engineering technology. The course will provide an overview of the environmental field to include laws and regulations, water quality, hydraulic and hydrologic fundamentals, water and wastewater treatment, groundwater contamination, and solid waste management. *(Spring)*

ETCE 3123. Cost Estimating. (3) Prerequisites: ETCE 1222, ~~ETCE 2112~~ or AAS degree or Departmental approval. Methods used to determine material quantities, labor and equipment requirements, and costs associated with construction activities and projects. *(Fall)*

ETCE 4126. Project Scheduling and Control. (3) Prerequisite**s**: ETCE 3123 **and CMET 3224**. Planning, scheduling, and monitoring construction projects, including development of critical path networks, Gannt bar charts, construction cost control, and reporting practices. *(Fall)*

ETGR 3171. Engineering Analysis I. (3) Prerequisite~~s~~: ~~differential and integral calculus~~ **MATH 1121**. Methods of solving engineering problems which involve the differentiation and integration of algebraic, trigonometric and logarithmic functions; use of integral tables.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: January 10, 2008

RE: Request to establish new course for Engineering Leadership Academy, ENGR 3095 (Leadership Academy Capstone)

The request to establish new course for Engineering Leadership Academy, ENGR 3095 (Leadership Academy Capstone) was approved by the Chair of the Undergraduate Course and Curriculum Committee on January 8, 2008 for implementation Fall Semester 2008.

Catalog Copy:

ENGR 3095. Leadership Academy Capstone. (0) Prerequisites: Admittance into the Leadership Academy program. Participants apply leadership, teamwork, ethical decision-making, communication, and strategic planning principles learned during prior semester. Leadership Academy modules to a community-based service learning project. Implementation and evaluation of projects are approved by Leadership Academy staff and advisory board members. *To be graded with S/U*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: January 10, 2008

RE: Request to make changes in the catalog copy for ECGR 2155, 2156, 2161, and 2181

The request to make changes in the catalog copy for ECGR 2155, 2156, 2161, and 2181 was approved by the Chair of the Undergraduate Course and Curriculum Committee on January 8, 2008 for implementation Fall Semester 2008.

Catalog Copy:

ECGR 2155. ~~Logic~~ Instrumentation and Networks Laboratory. (1)
(W) Prerequisites: MATH 1242 with a grade of C or better. Corequisites: ECGR 2111 ~~and 2181~~ or permission of Department. Network measurements and applications, ~~experimental logic design;~~ introduction to laboratory equipment and techniques.

ECGR 2156. ~~Instrumentation~~ Logic and Networks Laboratory. (1)
(W) Prerequisites: ECGR 2155 ~~(Logic and Networks Lab)~~. Corequisites: ECGR 2112 ~~(Network Theory II)~~ and 2181 or permission of Department. Experimental logic design, network measurements, applications, and instrumentations.

ECGR 2161. Basic Electrical Engineering I. (3) Prerequisite: ~~PHYS 2101~~ PHYS 2102 with a C or better. Fundamental concepts and methods of analysis of D.C. and A.C. circuits, elementary operation of electronic devices. Not open to Electrical and Computer Engineer majors.

ECGR 2181. Logic Systems Design I. (3) Prerequisite: MATH 1242 with a grade of C or better or permission of the Department. ~~Corequisite: ECGR 2155 or permission of the Department.~~ Introduction to Boolean algebra; mixed logic; design of combinational circuits; introduction to sequential systems; MSI building blocks; includes laboratory design projects.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: June 5, 2007

RE: Request to approve ETME 3232 (Senior Design Project I) as a "W" course.

The request to approve ETME 3232 (Senior Design Project I) as a "W"course was approved by the Associate Dean for General Education (Dr. Mark West) and Senior Associate Provost of Academic Affairs (Dr. Wayne Walcott) on June 4, 2007. It is approved for implementation Fall Semester 2007.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Program Assistant to Faculty Governance

DATE: May 25, 2007

RE: Request to establish a B.S. in Systems Engineering

The request to establish a B.S. in Systems Engineering was approved by the Undergraduate Course and Curriculum Committee on May 8, 2007 and the Faculty Council on the May 23, 2007 Consent Calendar, for forwarding to the Office of the President.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: April 13, 2007

RE: Request to revise prerequisites for graduate CEGR courses

The request to revise prerequisites for graduate CEGR courses was approved by the Chair of the Graduate Council on April 7, 2007 for implementation Spring Semester 2008.

Catalog Copy:

CEGR 5108. Finite Element Analysis and Applications. (3) Prerequisite: ~~CEGR 4224 or~~ permission of department. Finite element method and its application to engineering problems. Application of displacement method to plane stress, plane strain, plate bending and axisymmetrical bodies. Topics include but are not limited to dynamics, fluid mechanics, and structural mechanics. Prior coursework in CEGR 4224 is required. *(Spring)*

CEGR 5121. Prestressed Concrete Design. (3) Prerequisite~~s: CEGR 3225 and CEGR 4224 or~~ permission of the department. Analysis and design of prestressed components and systems, including materials and systems for prestressing, loss of prestress, flexural and shear design in accordance with current building codes, analysis of indeterminate prestressed systems, and control of camber, deflection and cracking. Prior coursework in CEGR 3225 and CEGR 4224 is required. *(Spring) (Alternate years)*

CEGR 5123. Bridge Design. (3) Prerequisite:~~s: CEGR 3221 and CEGR 3225, or~~ permission of the department. Review of bridge design codes and loadings; superstructure and substructure design of short, intermediate, and long span bridges constructed of steel and concrete; earthquake design; segmental and cable-stayed bridges. Prior coursework in CEGR 3221 and CEGR 3225 is required. *(Spring) (Alternate years)*

CEGR 5124. Masonry Design. (3) Prerequisite: ~~s: CEGR 3225 or~~ permission of the department. Introduction of masonry materials and engineering and materials properties and testing procedures. Design of reinforced and unreinforced masonry (clay and concrete) walls, beams

and columns for vertical, wind, and seismic loads. Analysis and design of masonry structures (including torsion) and introduction to computer applications. Prior coursework in CEGR 3225 is required. *(Spring) (Alternate years)*

CEGR 5141. Process Engineering. (3) Prerequisite: ~~CEGR 3141 or~~ permission of the department. Applications of material and energy balance principles to the study of chemical, biological and environmental engineering processes. Overview of applied biotechnology, engineering thermodynamics and kinetics. Prior coursework in CEGR 3141 is required. *(Fall)*

CEGR 5142. Water/Wastewater Engineering. (3) Prerequisite: ~~CEGR 3141or~~ permission of the department. Analysis and design of water and wastewater treatment processes including: physical, chemical and biological treatment. Computer-aided design of treatment systems. Prior coursework in CEGR 3141 is required. *(Spring)*

CEGR 5143. Solid Waste Management. (3) Prerequisite: ~~CEGR 3141 or~~ permission of the department. Solid waste management, sources, generation rates, processing and handling, disposal, recycling, landfill closures, and remedial actions for abandoned waste sites. Prior coursework in CEGR 3141 is required. *(Spring) (Alternate years)*

CEGR 5144. Engineering Hydrology. (3) Prerequisite: permission of department. A quantitative study of the various components of the water cycle, including precipitation, runoff, ground water flow, evaporation and transpiration, and stream flow. Hydrograph analysis, flood routing, frequency and duration, reservoir design, and computer applications. Prior course work in CEGR 3143 is required. *(Fall) (Alternate years)*

CEGR 5145. Groundwater Resources Engineering. (3) Prerequisite: ~~CEGR 3141 or~~ permission of the department. Overview of hydrological cycle. Principles of groundwater flow and well hydraulics. Regional groundwater flow and flow nets. Water chemistry and contamination. Applications of groundwater modeling. Prior coursework in CEGR 3141 is required. *(Fall)* ~~*(Alternate years)*~~

CEGR 5146. Advanced Engineering Hydraulics. (3) Prerequisite: ~~CEGR 3143 or~~ permission of the department. Problems of liquids as applied in civil engineering; open channel flow; dams and spillways; water power; river flow and backwater curves; pipe networks, fire flow, sewage collection, groundwater, computer applications. Prior coursework in CEGR 3143 is required. *(On demand)*

CEGR 5161. Advanced Traffic Engineering. (3) Prerequisite: ~~CEGR 3161 or~~ permission of the department. Analysis of basic characteristics of drivers, vehicles and roadway that affect the performance of road systems. Stream flow elements, volume, density, speed. Techniques of traffic engineering measurements, investigations and data analysis, capacity analysis. Intersections, accidents, parking. Prior coursework in CEGR 3161 is required. *(**Fall**~~On demand~~)*

CEGR 5162. Transportation Planning. (3) Prerequisite: ~~CEGR 3161 or~~ permission of the department. Urban transportation; travel characteristics of urban transportation systems; analysis of transportation-oriented studies; analytic methods of traffic generation, distribution, modal split and assignment; traffic flow theory. Prior coursework in CEGR 3161 is required. *(Spring~~On demand~~)*

CEGR 5171. Urban Public Transportation. (3) Prerequisite: ~~CEGR 3161 or~~ permission of the department. Planning, design, and operation of bus, rail, and other public modes. Relationship between particular modes and characteristics of urban areas. Funding, security and other administrative issues. Prior coursework in CEGR 3161 is required. *(On demand)* ~~*(Fall) (Alternate years)*~~

CEGR 5181. Human Factors in Traffic Engineering. (3) Prerequisite: ~~CEGR 3161 or~~ permission of the department. Study of the driver's and pedestrian's relationship with the traffic system, including roadway, vehicle and environment. Consideration of the driving task, driver and pedestrian characteristics, performance and limitations with regard to traffic facility design and operation. Prior coursework in CEGR 3161 is required. *(Alternate years)* ~~*(On demand)*~~

CEGR 5183. Traffic Engineering Studies. (3) Prerequisite: ~~CEGR 3161 or~~ permission of department. Introduction to the traffic engineering studies most used by traffic engineers including data collection techniques, statistical analysis procedures, report writing and presentation. One hour of lecture and three hours of laboratory per week. Prior coursework in CEGR 3161 is required. *(Fall) (Alternate years)* ~~*(On demand)*~~

CEGR 5184. Highway Safety. (3) Prerequisite: ~~CEGR 3161 or~~ permission of the department. Engineering responses at the state and local levels to the problem of highway safety. Extent of the highway safety problem, elements of traffic accidents, common accident countermeasures, collection and analysis of accident data, evaluation of safety-related projects and programs, and litigation issues. Prior coursework in CEGR 3161 is required. *(Fall)* (*Alternate years*)

CEGR 5185. Geometric Design of Highways. (3) Prerequisite: ~~CEGR 3152 or~~ permission of the department. Theory and practice of geometric design of highways including intersections, interchanges, parking and drainage facilities. Driver ability, vehicle

performance, safety and economics are considered. Two hours of lecture and three laboratory hours per week. Prior coursework in CEGR 3152 is required. (*On demand*)

CEGR 5222. Structural Steel Design II. (3) Prerequisite: ~~CEGR 3221 or~~ permission of department. Analysis and design of structural steel components and systems with emphasis on theories necessary for a thorough understanding of the design of complete structures. Compression members affected by local buckling, beams with lateral-torsional buckling, continuous beams and beam columns are covered. Welded and bolted connections. Current AISC Specifications used. Prior coursework in CEGR 3221 is required. *(Spring)*

CEGR 5224. Advanced Structural Analysis. (3) Prerequisite: ~~CEGR 3122 or~~ permission of the department. A continuation of CEGR 3122. Methods to determine deflections in structural members, including moment area, conjugate beam, virtual work, and Castigliano's theorem. Analyze statically indeterminate structures, including approximate method, slope deflection, moment distribution, and matrix stiffness methods. Project to compare analysis techniques and introduce use of structural analysis computer programs. Prior coursework in CEGR 3122 is required. *(Fall)*

CEGR 5226. Reinforced Concrete Design II. (3) Prerequisite: ~~CEGR 3225 or~~ permission of the department. Analysis and design of reinforced concrete components and systems with emphasis on the fundamental theories necessary for a thorough understanding of concrete structures. Concentrically loaded slender columns, slender columns under compression plus bending. Wall footings and column footings. Analysis of continuous beams and frames. Total design project involving the analysis and design of a concrete structure. Current ACI Specifications used. Prior coursework in CEGR 3225 is required. *(Spring)*

CEGR 5234. Hazardous Waste Management. (3) Prerequisite: ~~CEGR 3141 or~~ permission of the department. Integration of scientific and engineering principles with legislation, regulation and technology in the management of hazardous wastes. Study of thermal, chemical, physical and biological systems and processes used in the treatment of hazardous wastes and the remediation of hazardous waste sites. Prior coursework in CEGR 3141 is required. (*On demand*)

CEGR 5241. Chemical Processes in Water and Wastewater Treatment. (3) Prerequisite: ~~s: CHEM 1252 (Formerly CHEM 1102) and CEGR 3141, or~~ permission of the department. Chemical principles involved in the treatment of water and wastewaters; principles of chemical equilibrium relevant to natural water systems; the nature and effect of chemical interactions of domestic and industrial waste effluents on natural water systems. Prior coursework in CHEM 1252 and CEGR 3141 is required. (*On demand*)

CEGR 5243. Topics in Environmental Health. (3) Prerequisite: ~~s: CEGR 3141 and CEGR 4142, or~~ permission of the department. Study of contemporary environmental health problems and practices as they relate to groundwater pollution, food and water-borne diseases, radiological health, occupational health and risk assessment. Provides an introduction to epidemiology and toxicology, and a historical review of federal environmental policy and legislative action. Prior coursework in CEGR 3141 and CEGR 4142 is required. (*On demand*)

CEGR 5262. Traffic Engineering. (3) Prerequisite: ~~CEGR 3161 or~~ permission of the department. Operation and management of street and highway systems. Traffic control systems, traffic flow theory, and highway capacity. Evaluation of traffic engineering alternatives and the conduct of traffic engineering studies. Prior coursework in CEGR 3161 is required. *(Spring)*

CEGR 5264. Landfill Design and Site Remediation. (3) Prerequisite: ~~s: CEGR 3258 and CEGR 3278, or~~ permission of the department. Principles of waste disposal and sanitary landfill siting including design, construction, operation and maintenance. Site assessment of underground storage tank leaks; site remediation, and clean up technologies using choice and economic analysis and computer applications. Prior coursework in CEGR 3258 and CEGR 3278 is required. *(Spring) (Alternate years)*

CEGR 5270. Earth Pressures and Retaining Structures. (3) Prerequisite~~s: CEGR 3122 and CEGR 3278 or~~ permission of the department. Earth pressure theories, effects of wall friction and external loads (including earthquake); design of rigid retaining walls (including structural details); sheetpile wall design; soil reinforcement systems for retaining structures; computer applications. Prior coursework in CEGR 3122 and CEGR 3278 is required. (*On demand*)

CEGR 5270. Earth Pressures and Retaining Structures. (3) Prerequisite: permission of the department. Lateral earth pressure theory and the effects of wall friction, external loads , groundwater, and layered soils; design procedures and construction details associated with selected rigid and modular gravity/semi-gravity walls, mechanically stabilized earth walls, and externally supported structural walls. Previous course work in CEGR 3122, CEGR 3278 and CEGR 4278 is required. CEGR 4278 can be a corequisite. (*Fall)*

CEGR 5271. Pavement Design. (3) Prerequisite: ~~s: CEGR 3161 and CEGR 3278, or~~ permission of the department. Pavement design concepts and considerations; engineering properties of pavement materials including soils, bases, asphalt concrete, and Portland cement concrete; design of flexible and rigid pavements including shoulders and drainage; computer applications for pavement analysis and design. Prior coursework in CEGR 3161 and CEGR 3278 is required. (*On demand*)

CEGR 5272. Design with Geosynthetics. (3) Prerequisite: ~~s: CEGR 3258 and CEGR 3278 or~~ permission of the department. Types and properties of geosynthetics. Designing with geosynthetics for filtration, separation, drainage, soil reinforcement, stabilization, containment, and erosion control. Computer applications in design. Prior coursework in CEGR 3258 and CEGR 3278 is required. *(Fall) (Alternate years)*

CEGR 5272. Design with Geosynthetics. (3) Prerequisite: permission of the department. Introduction to geosynthetic materials, properties, laboratory test procedures, and functions; Geosynthetic design methods used for geotechnical, transportation, hydraulic, and geo-environmental applications (roadways, walls, slopes, foundation soils, landfills, and dams); The incorporation of geosynthetics for soil reinforcement, separation, filtration, drainage, and containment. Prior course work in CEGR 3258, CEGR 3278 and CEGR 4278 is required. CEGR 4278 can be a corequisite. *(Spring)*

CEGR 5278. Geotechnical Engineering II. (3) Prerequisite: ~~s: CEGR 3258 and CEGR 3278, or~~ permission of the department. Design of shallow and deep foundations, including structural considerations; lateral earth pressure theories; design of rigid and flexible earth retaining structures; advanced aspects of slope stability analysis; and computer applications. Prior coursework in CEGR 3258 and CEGR 3278 is required. (*Fall*)

CEGR 5892. Individualized Study and Projects. (1-6) Prerequisite: permission of the department. Individual investigation and exposition of results. May be repeated for credit. (*On demand*)

CEGR 5991. Graduate Research in Civil Engineering. (1-6) Prerequisite: permission of the department. Independent study of a theoretical and/or experimental problem in a specialized area of civil engineering. May be repeated for credit. *(On demand)*

CEGR 6090. Special Topics in Civil Engineering. (1-6) Prerequisite: permission of the department. Directed study of current topics of special interest. May be repeated for credit. *(On demand*

CEGR 6122. Advanced Topics in Structural Steel. (3) Prerequisite: ~~CEGR 4222 or~~ permission of the department. Theory of plastic-behavior of steel structures; current topics in structural steel. Prior coursework in CEGR 4222 is required. *(On demand)*

CEGR 6126. Analysis of Plates and Shells. (3) Prerequisite: ~~CEGR 4224, or~~ permission of the department. Analysis of rectangular and circular plates using classical as well as numerical methods; orthotropic and continuous plates and plate buckling. Analysis of thin shells and shells of revolution with and without bending; membrane theory of cylindrical shells; symmetric and unsymmetric loading; pipes, tanks, and pressure vessels; computer applications. Prior coursework in CEGR 4224 is required. *(On demand)*

CEGR 6127. Fracture Mechanics and Fatigue. (3) Prerequisite: ~~CEGR 3221 or~~ permission of the department. Introduction to fracture mechanics and fatigue, including Griffith Theory, plane strain-stress conditions, critical stress intensity factors, factors influencing fracture toughness, fracture mechanics design principles, fatigue performance, and fatigue initiation and propagation. Prior coursework in CEGR 3221 is required. *(On demand)*

CEGR 6128. Structural Optimization. (3) **Prerequisite**: ~~CEGR 4224, or~~ permission of the department. Introduction to optimization concepts; reformulation of common structural analysis and design problems to an optimization format; optimization of constrained,

unconstrained, linear, and nonlinear problems by classical and numerical techniques; and computer applications. Prior coursework in CEGR 4224 is required. *(On demand)*

CEGR 6129. Structural Dynamics. (3) Prerequisite: ~~CEGR 3122 or~~ permission of the department. Methods for dynamic analysis of single and multiple degree of freedom systems. Topics include free vibrations, dynamic response of simple structures under time dependent loads (e.g., harmonic, periodic, impulsive, general dynamic loading), support motion, frequency domain analysis, response spectra, earthquake engineering. Prior coursework in CEGR 3122 is required. *(On demand)*

CEGR 6142. Bioenvironmental Engineering. (3) Prerequisite: ~~CEGR 3141 or~~ permission of the department. Theoretical principles and design of aerobic and anaerobic biological unit processes for renovating waters and wastewaters. Activated sludge, aerated and facultative lagoons, rotating biological contractors, trickling and anaerobic filters. Prior coursework in CEGR 3141 is required. *(On demand)*

CEGR 6143. Bioprocess Technology. (3) Prerequisite: ~~s: CEGR 4141 and general microbiology, or~~ permission of the department. Introduction to metabolic pathways, growth kinetics and reactor theories. Laboratory investigation of the operation, optimization and scale-up problems associated with batch and continuous culture of microorganisms. Process analysis and modeling of environmental engineering processes. Prior coursework in CEGR 4141 and general microbiology is required. *(Spring)*

CEGR 6161. Traffic Control and Operation. (3) Prerequisite: ~~CEGR 5161 or~~ permission of the department. Traffic control theory and application; traffic regulation, laws and ordinances; speed control, intersection control, flow control and parking control; design and application of control devices, investigation, evaluation techniques; statistical analysis; administration. Prior coursework in CEGR 5161 is required. (*On demand*)

CEGR 6165. Urban Systems Engineering. (3) Prerequisite: ~~CEGR 3202 or~~ permission of the department. Survey of economic, political, sociological and technological factors affecting modern growth; a planning process and its role in solving selected urban problems with emphasis on engineering contributions. Prior coursework in CEGR 3202 is required. *(On demand)*

CEGR 6173. Environmental Aquatic Chemistry. (3) Prerequisite: ~~CHEM 3111 or CHEM 3141, or equivalent, or~~ permission of the department. Concepts of chemical equilibrium applied to natural aquatic systems. Topics include acid-base reactions, buffer systems, mineral precipitation, coordinate chemistry, redox reactions, adsorption phenomena and chemical-equilibria computer programs. Prior coursework in CHEM 3111 or CHEM 3141 is required. *(Spring) (Alternate years)*

CEGR 6181. Traffic Flow Theory. (3) Prerequisite: ~~CEGR 5161 or~~ permission of the department. Logical foundations and mathematical representation of traffic flow; interrelation between microscopic and macroscopic equations of motion for highway traffic; stochastic properties of traffic at low and moderate densities. Car-following theories of traffic flow at high densities. Applications of queuing theory. Prior coursework in CEGR 5161 is required. *(On demand)*

CEGR 6182. Transportation Systems Analysis. (3) Prerequisite: ~~CEGR 5161 or~~ permission of the department. Issues, concepts and methods of transportation systems engineering and planning. Decision making in transportation management. The application of analytical methods to the development and evaluation of transport systems. Prior coursework in CEGR 5161 is required. *(On demand)*

CEGR 6252. Soil Dynamics and Earthquake Engineering. (3) Prerequisite: ~~s: CEGR 3122 and CEGR 3278, or~~ permission of department. Review of the dynamics of single and multi degree of freedom systems. Earthquake mechanism, distribution, magnitude, intensity, ground shaking, site effects, prediction, and response spectra. Soil liquefaction; aseismic design of foundations; seismic codes; and machine foundation design. Prior coursework in CEGR 3122 and CEGR 3278 is required. (*On demand*)

CEGR 6261. Traffic Signal Control Systems. (3) Prerequisite: ~~CEGR 6161 or~~ permission of the department. Study of control systems for isolated intersections, arterial streets, closed networks, and freeways. Emphasis on computer models; state-of-the-art detection, control, and communications equipment and software; and intelligent vehicle/highway systems. Prior coursework in CEGR 6161 is required. (*Fall*)

CEGR 6268. Advanced Soil Mechanics. (3) Prerequisite: ~~s: CEGR 3258 and CEGR 3278, or~~ permission of the department. One and two-dimensional consolidation, layered strata effects, and creep; seepage in layered strata, flow net, and seepage forces; shear strength parameters, effective and total stress paths, and application for slope stability evaluation; principles of critical state soil mechanics; computer applications. Prior coursework in CEGR 3258 and CEGR 3278 is required. (*On demand*)

CEGR 6892. Individualized Study and Projects. (1-6) Prerequisite: permission of the department. Individual investigation and exposition of results. May be repeated for credit. *(On demand)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: April 13, 2007

RE: Request to revise CEGR 5272

The request to revise CEGR 5272 was approved by the Chair of the Graduate Council on April 7, 2007 for implementation Spring Semester 2008.

Catalog Copy:

CEGR 5272. Design with Geosynthetics. (3) Prerequisites: permission of the department. Introduction to geosynthetic materials, properties, laboratory test procedures, and functions; geosynthetic design methods used for geotechnical, transportation hydraulic, and geo-environmental applications (roadways, walls, slopes, foundation soils, landfills, and dams); the incorporation of geosynthetics for soil reinforcement, separation, filtration, drainage and containment. Prior coursework in CEGR 3258, CEGR 3278 and CEGR 4278 is required. CEGR 4278 can be a co-requisite. *(Spring)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: April 13, 2007

RE: Request to revise CEGR 5270

The request to revise CEGR 5270 was approved by the Chair of the Graduate Council on April 7, 2007 for implementation Spring Semester 2008.

Catalog Copy:

CEGR 5270. Earth Pressures and Retaining Structures. (3) Prerequisites: permission of the department. Lateral earth pressure theory and the effects of wall friction, external loads, groundwater, and layered soils; design procedures and construction details associated with selected rigid and modular gravity/semi-gravity walls, mechanically stabilized earth walls, and externally supported structural walls. Previous course work in CEGR 3112, CEGR 3278 and CEGR 4278 is required. CEGR 4278 can be a co-requisite. *(Fall)*

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: April 9, 2007

RE: Request to revise prerequisites and co-requisites for MEGR 3111, 3116, 3121, 3122, & 3161

The request to revise prerequisites and co-requisites for MEGR 3111, 3116, 3121, 3122, & 3161 was approved by the Chair of the Undergraduate Course and Curriculum Committee on April 4, 2007 for implementation Spring Semester 2008.

Catalog Copy:

MEGR 3111. Thermodynamics I. (3) Prerequisite: **MATH 2171, with a grade of *C* or better**. First and second laws of thermodynamics. Work and heat carnot cycle. Ideal and real gases. No-reactive mixture of gases. Availability and irreversibility.

MEGR 3116. Introduction to Heat Transfer. (3) Prerequisites: **MATH 2171** and MEGR 3111, **both with a grade of *C* or better**. One and two dimensional steady state conduction. Finite difference methods. Radiative heat transfer, emissivity, black body radiation. Heat exchange among two and multi-body systems. Introduction to concepts and applications of convective heat transfer.

MEGR 3121. Dynamics Systems I. (3) Prerequisites: MEGR 2141 and MATH 1242, both with a grade of *C* or better. ~~Co-requisite: MEGR 3111.~~ The kinematics and kinetics of rigid bodies. Work-energy and impulse-momentum principles and momentum principles and conservation laws. Introduction to the kinematics of mechanisms.

MEGR 3122. Dynamics Systems II. (3) Prerequisites: MEGR 2240, MEGR 3121 **and MATH 2171, all with a grade of *C* or better**. Modeling of mechanical dynamic systems. Vibration of lumped mass systems. Analysis and design of mechanical systems using time domain and frequency domain methods.

MEGR 3161. Introduction to Engineering Materials. (3) Prerequisites: CHEM 1251, MATH 2171, and MEGR 2144 **with a grade of *C* or better.** Classifications of engineering materials. Introduction to property structure relationships. Ideal and defect atomic structures of solids with examples from metals, ceramics and polymers. Cold working and annealing effects. Phase equilibria in alloys; introduction to diffusional processes and transformation kinetics.

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: April 9, 2007

RE: Request to add ETGR 2101 as a prerequisite for ETME 3133 (Fluid Mechanics)

The request to add ETGR 2101 as a prerequisite for ETME 3133 (Fluid Mechanics) was approved by the Chair of the Undergraduate Course and Curriculum Committee on April 4, 2007 for implementation Spring Semester 2008.

Catalog Copy:

ETME 3133. Fluid Mechanics. (3) Prerequisite: ETGR 2101. Fundamental principles of fluid mechanics. Topics include manometry, buoyancy, forces on submerged bodies, boundary layers, flow over surfaces, Bernoulli's equation with applications, orifices, pipe losses and an introduction to hydrodynamics.

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: April 9, 2007

RE: Request to edit the catalog descriptions for ECGR courses

The request to edit the catalog description for ECGR courses was approved by the Chair of the Undergraduate Course and Curriculum Committee on April 4, 2007 for implementation Spring Semester 2008.

Catalog Copy:

ECGR 4222. Random Processes and Optimum Filtering (3) Crosslisted as ECGR 5122. Prerequisites: ECGR 3111 and STAT **3128** ~~3228~~ or permission of Department. Review of probability, univariate and multivariate distribution functions; random processes, discrete and continuous time processes, widesense stationary, ergodicity; time- and frequency-domain analysis; linear systems, optimim filtering, Wiener filters, Kalman filters; application . *(On demand)*

- *Needed to correct prerequisite (Statistics Department has never had course with course number 3228.)*

MEMORANDUM

TO: Dean Robert Johnson, Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: April 9, 2007

RE: Request to edit the catalog description for CEGR 3890 to read “May be repeated for credit.”

The request to edit the catalog description for CEGR 3890 to read "May be repeated for credit." was approved by the Chair of the Undergraduate Course and Curriculum Committee on April 4, 2007 for implementation Retroactive to Fall 2006 term.

Catalog Copy:

CEGR 3890. Individualized Study. (1-3) Prerequisite: Consent of CEE Advisor. Supervised individual study within an area of a student's particular interest which is beyond the scope of existing courses. May be repeated for credit. *(On demand)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: February 26, 2007

RE: Request to make prerequisite changes to ECE graduate courses

The request to make prerequisite changes to ECE graduate courses was approved by the Chair of the Graduate Council on February 20, 2007 for implementation Fall Semester, 2007.

Catalog Copy:

ELECTRICAL AND COMPUTER ENGINEERING (ECGR)

Proposed Changes to Course Descriptions

(Deletions marked in red, additions marked in blue)

Unchanged course are not included

ECGR 5102. Engineering Simulation. (3) Prerequisite: ECGR 2103 ~~or consent of department~~ or equivalent. A wide range of simulation related topics will be introduced including the theory of simulation, characteristics of simulators, and trade-offs in simulation studies. Continuous and discrete simulation with primary emphasis on application of simulation techniques to engineering problems. Simulation of actual problems based on students' interest and experience areas. Credit will not be given for ECGR 5102 where credit has been given for ECGR 4102. *(On demand)*

ECGR 5103. Applied Computer Graphics. (3) ~~Prerequisite: permission of department.~~ Interactive graphics; raster, character, vector, graphics, display technologies; rotation, scaling, translating of graphics image; image processing/enhancement; feature extraction; 3-D graphics; hidden lines. Credit will not be given for ECGR 5103 where credit has been given for ECGR 4103. *(On demand)*

ECGR 5104. Computational Methods in Power Systems. (3) Prerequisite: ECGR 4142 ~~or consent of department~~ or equivalent. Numerical techniques for analysis, operation and planning of power systems. Sparse matrix techniques applied to power flow algorithms. Economic operation of power systems. Optimum power flow. Credit will not be given for ECGR 5104 where credit has been given for ECGR 4104. *(On demand)*

ECGR 5113. Network Synthesis. (3) Prerequisite: ECGR ~~4114~~ 4113 or equivalent. The positive real concept, properties and methods of testing. Realizability conditions on driving point functions. Methods of synthesis of one-port. Physical realizability and properties of two-port networks. Transfer function synthesis. Approximation methods. Credit will not be given for ECGR 5113 where credit has been given for ECGR 4183. *(On demand)*

ECGR 5114. Device Characterization, Parameterization and Modeling. (3) Prerequisite: ECGR 3132 and ECGR 4134 ~~or permission of department~~ or their equivalents. Advance device and circuit analysis; device and circuit simulation using SPICE, ECAP or equivalent. Parametric modeling of active devices. Device characterization and parameterization; temperature effects; thermal cycling. Analysis of device failure modes. Credit will not be given for ECGR 5114 where credit has been given for ECGR 4184. *(On demand)*

ECGR 5121. Antennas. (3) Prerequisite: ECGR 3122 ~~with a grade of C or better or permission of the department~~ or equivalent. Radiation into free space, the point source, thin linear antenna, arrays of linear elements, aperture antennas, impedance, methods of feeding, matching and termination. Antenna systems. Credit will not be given for ECGR 5121 where credit has been given for ECGR 4121. *(On demand)*

ECGR 5122. Random Processes and Optimum Filtering. (3) Prerequisites: ECGR 3111 and STAT 3228 ~~or permission of department~~ or their equivalents. Review of probability, univariate and multivariate distribution functions; random processes, discrete and continuous time precesses, widesense stationary, ergodicity; time-and frequency-domain analysis; linear systems, optimum filtering, Wiener filters, Kalman filters; application. Credit will not be given for ECGR 5122 where credit has been given for ECGR 4422. *(Spring)*

ECGR 5123. Advanced Electromagnetic Field Theory. (3) Prerequisite: ECGR 3122 ~~or permission of department~~ or equivalent. Maxwell's equations and propagation. Properties of guided and surface waves. Wave properties of light; physical and fiber optics. Credit will not be given for ECGR 5123 where credit has been given for ECGR 4185. *(On demand)*

ECGR 5124. Digital Signal Processing. (3) Prerequisite: ~~EEGR~~ ECGR 3112 ~~with a grade of C or better~~ or equivalent. Sampling and signal recovery in linear systems; analysis of sampled systems; discrete and fast Fourier transforms; z-transform; discrete convolution; design of digital FIR and IIR filters. Credit will not be given for ECGR 5124 where credit has been given for ECGR 4124. *(Spring)*

ECGR 5132. Analog Integrated ~~Circuits~~ Circuit Design. (3) Same as ECGR 4132. Prerequisite: ECGR 4131 ~~or permission of department~~ or equivalent. Topics include analog MOS modeling, design of current mirrors, references, and operational amplifiers. Both hand analysis and SPICE simulation utilized. Credit will not be given for ECGR 5132 where credit has been given for ECGR 4132. (Spring)

ECGR 5133. VLSI Systems Design. (3) Prerequisite: ECGR 2181 and 3131 ~~or permission of department~~ or their equivalents. Analysis, design, and synthesis of very large scale integrated circuits. A project-oriented course relying heavily on computer-aided design

tools for logic, layout design, and simulation. Credit will not be given for ECGR 5133 where credit has been given for ECGR 4433. *(Fall) (Evenings)*

ECGR 5134. Advanced VLSI Systems Design. (3) Prerequisite: ECGR 5133 or permission of the department. A project-oriented course dealing with advanced topics in VLSI systems design and analysis such as circuit design techniques, array structures, performance estimation, automated routing and device electronics. Credit will not be given for ECGR 5134 where credit has been given for ECGR 4188. *(Spring)*

ECGR 5135. Physical Electronics. (3) Prerequisite: ECGR 3122 ~~or PHYS 3181 or permission of department~~ or equivalent. Dynamics of charged particles; electron motion in electromagnetic fields; types of electron emission; beam focusing; longitudinal and transverse beam waves; microwave generation; plasma parameters. Credit will not be given for ECGR 5135 where credit has been given for ECGR 4135. *(On demand)*

ECGR 5137. Device Electronics for Integrated Circuits. (3) Prerequisites: ECGR 3132 and ECGR 4134, ~~or permission of the department~~ or their equivalents. The basic operating principles of electronic devices in integrated circuits are treated. The physical models of these devices are discussed. Graduate students are required to carry out laboratory experimentation. Credit will not be given for ECGR 5137 where credit has been given for ECGR 4137. *(Fall) (Evenings)*

ECGR 5138. Electronic Thin Film Materials and Devices. (3) Prerequisite: ECGR 4133 or 3132, ~~or permission of the department~~ or equivalent. Applications of thin films in microelectronics/optoelectronics manufacturing processes; vacuum technology, deposition techniques, and the characterization methods relevant to optoelectronic applications; thin film applications such as metallization, silicide formation, light emitting diodes (LED) and lasers, and doping of semiconductors. Credit will not be given for ECGR 5138 where credit has been given for ECGR 4138. *(Fall)*

ECGR 5139. Digital Communication Systems. (3) Prerequisites: : ~~ECGR 2181 and 3131~~ ECGR 3111 or equivalent. Topics include digital data transmission systems, signal and system representation, digital system performance characterization, pulse code modulation, and statistical communications theory. Credit will not be given for ECGR 5139 where credit has been given for ECGR 4139. *(On demand)*

ECGR 5142. Power Generation: Operation and Control. (3) Prerequisite: ECGR 4142 ~~or consent of department~~ or equivalent. Characteristics of power generation units, steam, nuclear reactor and hydroelectric. Economic and thermal system dispatch. Transmission losses, load flow problems. Hydro scheduling, hydro-plant models. Energy production cost models. Interchange evaluation. Credit will not be given for ECGR 5142 where credit has been given for ECGR 4190. (Fall) (Alternate years) *(Evenings)*

ECGR 5143. Dynamic and Transient Analysis of Power Systems. (3) Prerequisite: ECGR 4142 ~~or permission of the department~~ or equivalent. Large-scale systems state descriptions and hierarchical control. State space models, dynamic stability and testing. Stability of simple and multi-machine systems. Transient phenomena in electrical power systems. Transient stability problem. Credit will not be given for ECGR 5143 where credit has been given for ECGR 4191. *(Spring) (Alternate years) (Evenings)*

ECGR 5146. Introduction to VHDL. (3) Prerequisites: ECGR 2182 or equivalent and knowledge of a computer language ~~or permission of the department~~. Introduction to VHSIC Hardware Description Language (VHDL) including VHDL-based high-level design of microelectronic systems, VHDL programming, and VHDL synthesis; emphasis on learning and using industry-standard VHDL tools running on VNIX workstations. Credit will not be given for ECGR 5146 where credit has been given for ECGR 4146. *(Fall)*

ECGR 5161. Control of Robotic Manipulators. (3) Prerequisites: ECGR 4161 and 4111, or their equivalents. Control of industrial robots including linear, nonlinear, and adaptive control of robot's motion plus control of forces and torques exerted by the end-effector. Additional topics include computer animation of the controlled behavior of industrial robots, actuator and sensor types, robot vision, and control computer/robot interfacing (dual-listed with MEGR 5128). Credit will not be given for ECGR 5161 where credit has been given for ECGR 4162. *(Spring)*

ECGR 5165. Laser Electronics I. (3) Prerequisites: ECGR ~~3121~~ 3122 and PHYS 3141, ~~with a grade of C or better or permission of the Department~~ or their equivalents. Basic principles of quantum electronics, interaction of light with atoms, properties of laser light, laser applications. Electromagnetic aspects of lasers, Maxwell's Equations and beam, ray optics, matrix methods for the analysis and synthesis of optical systems. Laser

resonator design, oscillations modes, mode frequency and stability. Credit will not be given for ECGR 5165 where credit has been given for ECGR 4165. *(Fall)*

ECGR 5181. Computer Arithmetic. (3) ~~Prerequisite: permission of department.~~ Principles, architecture and design of fast two operand adders, multi-operand adders, standard multipliers and dividers. Cellular array multipliers and dividers. Floating point processes, BCD and excess three adders, multipliers and dividers. Credit will not be given for ECGR 5181 where credit has been given for ECGR 4181. *(On demand)*

ECGR 5182. Digital System Testing. (3) Prerequisite: ECGR 2181 ~~with a grade of C or better or permission of the Department~~ or equivalent. System testing; Boolean difference; D-algorithm; checking experiments; redundancy, computer-aided digital test systems. Credit will not be given for ECGR 5182 where credit has been given for ECGR 4182. *(Spring)*

ECGR 5187. Data Communications. (3) ~~Prerequisite: permission of department.~~ Principles of data communication; computer communications architecture (layering) with emphasis on the physical layer and data link layer, transmission media; analog and digital signal representation; data transmission basics; Shannon's theorem; error detection/correction; data compression; point-to-point protocols; multiplexing. Credit will not be given for ECGR 5187 where credit has been given for ECGR 4187. *(Fall)*

ECGR 5188. Modeling and Analysis of Dynamic Systems. (3) Prerequisite: ECGR 3111 ~~or permission of the department~~ or equivalent. Models and dynamical properties of mechanical, thermal, and fluid systems, utilizing by analogy the properties of electrical circuit theory. Emphasis on the formulation of circuit models and the development of terminal equations of system components. Dynamic response to step, pulse, and sinusoidal driving functions using Laplace transforms. Sinusoidal steady-state and frequency response of systems. Credit will not be given for ECGR 5188 where credit has been given for ECGR 4113. *(On demand)*

ECGR 5190. Acoustics. (3) Prerequisite: ECGR 3122 ~~or PHYS 4231~~or equivalent. Vibrations and simple vibrating systems; radiating systems; plane waves of sound; dynamic analogies, microphones and other acoustic transducers; acoustic measurements. Credit will not be given for ECGR 5190 where credit has been given for ECGR 4122. *(On demand)*

ECGR 5191. Analog and Digital Communication. (3) Prerequisite: ECGR 3111 or equivalent. Analysis and transmission of signals including analog communication systems (amplitude and frequency modulation, effect of noise); digital communications systems (pulse code modulation, data transmission systems phase-shift keying and frequency-shift keying, effect of noise). Credit will not be given for ECGR 5191 where credit has been given for ECGR 4123. *(Fall) (Evenings)*

ECGR 5192. Solid State Microelectronics II. (3) Prerequisites: ECGR 3122 and 3133 ~~each with a grade of C or better~~ or their equivalents. Advanced device concepts for MOSFET, bipolar, and CMOS integrated circuits. Gate length, transit time, and power-frequency limits. Device scaling concepts. Tunneling and avalanche devices, and hot electron behavior. Device and interconnect reliability and failure and device interconnects. Submicron channel, MODFET, and quantum well devices. High frequency solid state devices. Limits of switching speed. Solid state power devices. Credit will not be given for ECGR 5192 where credit has been given for ECGR 4134. *(Spring)*

ECGR 5193. Power System Analysis I. (3) Prerequisite: ECGR 3142 ~~with a grade of C or better~~ or equivalent. Representation of power system components for analysis studies. Transmission line parameters. Network equations. Load flow analysis and numerical methods. Credit will not be given for ECGR 5193 where credit has been given for ECGR 4141. *(Fall)*

ECGR 5194. Power System Analysis II. (3) Prerequisite: ECGR 4141 ~~with a grade of C or better~~ or equivalent. Economic operation of power systems. Short circuit studies. Symmetrical components. Transient stability analysis. Credit will not be given for ECGR 5194 where credit has been given for ECGR 4142. *(Spring)*

ECGR 5195. Electrical Machinery. (3) Prerequisite: ECGR 3142 ~~with a grade of C or better~~ or equivalent. Advanced theory of transformers and rotating. Machines; harmonic and saturation effects on machine performance. Unbalanced operation and transient conditions. Credit will not be given for ECGR 5195 where credit has been given for ECGR 4143. *(On demand)*

ECGR 5196. Introduction To Robotics. (3) Prerequisites: ECGR 2103 ~~or MEGR 2101 and senior standing~~ or equivalent. Modeling of industrial robots including homogeneous transformations, kinematics, velocities, static forces, dynamics, computer animation of dynamic models, motion trajectory planning, and introduction to vision, sensors and actuators (dual-listed with MEGR 4127). Credit will not be given for ECGR 5196 where credit has been given for either ECGR 4161 or MEGR 4127. *(Fall)*

ECGR 5197. Optical Communication. (3) Prerequisites: ECGR 4125 ~~or permission of the department~~ or equivalent. Overview of optical fiber, signal degradation in fiber, optical source, optical detectors, optical receiver, optical transmitter, optical network, signal processing, and signal distribution through DWDM and DWDDM. This course also addresses the recent topics in optical communication and optical signal. Credit will not be given for ECGR 5197 where credit has been given for ECGR 4186. *(Fall)*

ECGR 5231. Optical Materials. (3) Prerequisites: ECGR 4125 ~~or permission of Department~~ or equivalent. Overview of optical properties of semiconductors and dielectrics, optical waves in crystalline and periodic structures, optical nonlinearities and their applications in optical frequency conversions, and current topics in optical properties. *(Spring)*

ECGR 5261. Microwave Circuit Design I. (3) Prerequisites: ECGR 3131 ~~and graduate standing, or permission of department~~ or equivalent. Design and analysis of microwave devices and circuits; including microwave aspects of discrete active (i.e., field effect and bipolar transistors, etc.) and passive (i.e., microstrips, inductors, capacitors) components; device parameter extraction, using computer aided design (CAD) tools. Credit will not be given for ECGR 5261 where credit has been given for ECGR 4261. *(Fall)*

ECGR 5265. Microwave Devices and Electronics. (3) Prerequisites: ECGR 3122 and PHYS 2231 ~~with grades of C or better or permission of department~~ or their equivalents. Microwave transmission line theory, parameters, microwave waveguides, microstrip line and components including resonators, slow-wave structures, tees, rings, couplers, circulators, isolators, and microwave tubes. Microwave solid state electronics including microwave transistors, tunnel diodes, transferred electron devices, avalanche transit-time devices, and mono-lattice microwave integrated circuits. Credit will not be given for ECGR 5265 where credit has been given for ECGR 4265. *(On demand)*

ECGR 5411. Control Systems Theory I. (3) Prerequisite: ECGR 3111 ~~with a grade of C or better~~ or equivalent. Transfer functions, block diagrams and signal flow graphs. Feedback control system characteristics. The performance and stability of feedback systems using root locus and frequency response methods. Time domain analysis of control systems. The design and compensation of control systems. Credit will not be given for ECGR 5411 where credit has been given for ECGR 4111. *(Fall)*

ECGR 5412. Control Systems Theory II. (3) Prerequisite: ECGR 4111 ~~with a grade of C or better~~ or equivalent. State space techniques and useful state space methods. System stability. Controllability and observability of linear systems. The formulation of the state equations for discrete-time systems and the analysis of these systems by matrices. Analysis of nonlinear systems. Optimal control systems studies. Credit will not be given for ECGR 5412 where credit has been given for ECGR 4112. *(Spring)*

ECGR 5431. Linear Integrated Electronics. (3) Prerequisite: ECGR 3132 ~~with a grade of C or better~~ or equivalent. Design of linear integrated circuits utilizing bipolar and MOS devices. Application in linear amplifier design, control and processing of analog signals. Power supply regulators, analog switches, and active filters. Credit will not be given for ECGR 5431 where credit has been given for ECGR 4131. *(Fall)*

ECGR 6111. Systems Theory. (3) Prerequisite: ECGR 4112 ~~or consent of Department~~ or equivalent. State space concepts and solutions. Introduction to theory of deterministic linear systems. Application of matrix methods and vector difference equations to lumped parameter electrical mechanical and fluid systems, and discrete time systems. Frequency domain techniques in signal and systems analysis. Computer simulation of system dynamics. Credit will not be given for ECGR 6111 where credit has been given for ECGR 8111. *(Fall) (Evenings)*

ECGR 6112. Digital Control Systems. (3) Prerequisites: ECGR 6111 ~~and 4181~~ or consent of instructor. Time-domain and Z-domain analysis of linear discrete systems, open and closed loop sampled data systems, engineering characteristics of computer control systems, simulation of system dynamics. Credit will not be given for ECGR 6112 where credit has been given for ECGR 8112. *(Spring, Alternate years)*

ECGR 6122. Advanced Theory of Communications II. (3) Prerequisite: ~~ECGR 6121 or permission of Department~~ graduate standing. Continuation of ECGR 6121 including coding and

decoding methods. Wave form communications. Applications. Credit will not be given for ECGR 6122 where credit has been given for ECGR 8122. (Spring, Alternate years) *(Evenings)*

ECGR 6125. Advanced Topics in Optical Engineering. (3) Prerequisite: ECGR 5125 or consent of department. Overview of optical passive and active devices and discussion of current advances in optical technologies. Credit will not be given for ECGR 6125 where credit has been given for ECGR 8125. *(On demand)*

ECGR 6127. Medical Ultrasonics. (3) Prerequisite: ECGR 3122 ~~or PHYS 4231 with grade of C or better, or permission of Department~~ or equivalent. Acoustic wave propagation in fluids and solids, acoustic impedances, acoustic radiators and beam profiles; piezoelectricity, piezoelectric ceramics and polymers, integrated ultrasound transducers, design and testing of medical ultrasound transducers; hyperthermia, imaging, tissue characterization. Credit will not be given for ECGR 6127 where credit has been given for ECGR 8127. *(Spring)*

ECGR 6143. Power System Control. (3) Prerequisites: ECGR 4142 and 4111 ~~or permission of Department~~ or their equivalents. Computer functions for automatic control of power systems. Automatic generation control, regulation of frequency and tie-line power interchanges. Automatic voltage regulation, excitation system model. Power system dynamics. Computer control centers. Credit will not be given for ECGR 6143 where credit has been given for ECGR 8143. *(On demand)*

ECGR 6183. Multiprocessor Systems Design. (3) Prerequisites: ECGR 3184 or equivalent and 5131 or permission of the instructor. Topics include applications of multiprocessors to digital systems design; hardware/software tradeoff considerations; master/slave, multiple/master and loosely coupled systems; data handling and synchronization problems, networking. Credit will not be given for ECGR 6183 where credit has been given for ECGR 8183. *(On demand)*

ECGR 6184. Computer System Engineering. (3) ~~Prerequisite: consent of Department.~~ Topics include data formats, register transfer operations, computer organization, microprogram control and ALU design. Arithmetic algorithms, I/O organization and memory organization are also covered. Specific emphasis is placed throughout on tradeoffs

between hardware and software. Credit will not be given for ECGR 6184 where credit has been given for ECGR 8184. *(On demand)*

ECGR 6185. Advanced Microprocessor-Based Design. (3) Prerequisite: ~~CSCI 4181 or~~ permission of Department. An advanced course in computer design utilizing 16-bit micro processors. Architecture, software, and interface techniques. This course is project-oriented, involving the use of a logic analyzer. Credit will not be given for ECGR 6185 where credit has been given for ECGR 8185. *(Fall) (Evenings)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: February 20, 2007

RE: Request to establish ECGR 4090 (Special Topics in Electrical Engineering)

The request to add ECGR 4090 (Special Topics in Electrical Engineering) was approved by the Chair of the Undergraduate Course & Curriculum Committee on January 31, 2007 for implementation Fall Semester, 2007.

Catalog Copy:

ECGR 4090. Special Topics in Electrical Engineering. (1-4) Prerequisite: Permission of the Department. Cross-listed with ECGR 5090. Directed study of current topics of special interest. May be repeated for credit. *(On demand)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: February 2, 2007

RE: Request to edit Computer Engineering curriculum

The request to edit Computer Engineering curriculum was approved by the Chair of the Undergraduate Course & Curriculum Committee on January 30, 2007 for implementation Fall Semester, 2007.

Catalog Copy:

Bachelor of Science in Computer engineering (B.S.Cp.E.)

The curriculum in Computer engineering leading to the B.S.Cp.E. degree consists of 125 semester credit hours. The curriculum was developed to meet the following **Program Educational Objectives:**

- *Provide our students a solid foundation in the field of computer engineering within an environment that fosters hands-on design and synthesis experience.*
- *Prepare our students for leadership positions by providing a balanced educational experience with emphasis on communication skills, teamwork, and professional practice, including values and ethics.*
- *Provide sufficient curriculum flexibility to allow every student to synthesize a program of study that is specific to the students' interests within the diverse field of computer engineering.*
- *Provide our students sufficient breadth of knowledge to understand the broad relationships of the various areas within engineering, and sufficient depth as a concentration within one of those areas.*

The following curriculum became effective for all students entering the program in the summer of 2002 and thereafter. Students who entered the program prior to the summer of 2002 should consult earlier versions of the *Catalog* or contact the ECE department.

The degree requirements are:

University Goals. 48 hours meeting and surpassing the University General Education requirements, including 12 hours of communications, 9 hours of math, and 12 hours of science.

Core 1. Advanced Problem Solving: Nine hours of advanced problem solving courses.

Core 2. Computer Engineering: **51** hours of computer engineering including introduction to engineering, programming and data structures, network theory, electronics, logic design, data communications, and computer organization and architecture.

~~**Breadth.** 12 hours of required courses from four different concentration areas.~~

Depth. Six hours of electives, where the student chooses two courses from one of the three depth areas. ~~Combined with the Breadth requirement, this results in a minimum of nine hours in a concentration area~~.

Professional Development and Practice: One hour of professional development and two hours of professional practice.

Senior Design Capstone. Five hours of senior design project.

Restricted Electives. ~~Three hours of engineering, information technology computer science, math, physics, chemistry, or biology at the 2xxx level or above~~. Six hours of engineering, information technology computer science, math, statistics, physics, chemistry, biology, or software and information systems with the stipulation that at least one course must be taken in biology, chemistry, physics, math, or statistics. For further details consult your academic advisor.

Total: 125 semester hours

CURRICULUM OUTLINE: BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

University Goals - 48 hours

I. Communication: ENGL 1101, ENGL 1102, ECGR 3254, and ENGL 2116 –or– any 3-hour 2xxx level (or above) course with a writing intensive (W) designation.....12

II. Problem Solving: MATH 1241, 1242; STAT 2122..... 9

III. Social Science: ECON 2101..... 3

IV. Science: PHYS 2101/L, PHYS 2102/L, CHEM 1251/L..... 12

V. Liberal Studies/Arts & Society: Choose one course from {LBST 1101, 1102, 1103, 1104 or 1105}..... 3

VI. Liberal Studies/Western: LBST 2101..... 3

VII. Liberal Studies/Global: LBST 2102..... 3

VIII. Liberal Studies/Ethical & Cultural issues: Choose one course from {LBST 2211, 2212, 2213, 2214, or 2215}..... 3

Core 1. Advanced Problem Solving – 9 hours

MATH 1165, MATH 2171 and one course from: {MATH 2164 2241, 3116, 3166, OPRS 3111, OPRS 3113, or PHYS 3141}..... 9

Core 2. Computer Engineering – 51 hours

Core 1 & 2 Subtotal..... 60

Breadth: Required courses from four different concentration areas..... 12

Depth: Two ~~ECGR~~ courses ~~at 3XXX or above,~~ chosen from one of the depth areas..... 6

Senior Design Capstone:..... 5

Professional Development:..... 1

Professional Practice:.....2

Restricted Electives: Two Courses (COE or MATH/STAT/PHYS/CHEM/BIOL/ITCS) courses..... 6

Total Hours: 125

~~**Breadth Requirement** – required courses from four different concentration areas:~~

~~(1) Design & Test: ECGR 4146 Intro to VHDL~~
~~(2) Communications: ECGR 4124 Digital Signal Processing~~
~~(3) Device Electronic & Technology: ECGR 3132 Electronics II~~
~~(4) Computer Architecture/Software Systems: ECGR 4101 Embedded Systems~~

Depth Elective Requirement - choose two ECGR courses from one of ~~four~~ three areas:

~~**1. Design & Test**~~

~~ECGR 3182 Digital Electronics~~
~~ECGR 4132 Analog Integrated Circuits Design~~

~~ECGR 4182 Digital System Testing~~
~~ECGR 4433 VLSI Systems Design~~
~~ITCS 3183 Hardware Systems Design~~
~~ITCS 4181 Microcomputer Interfacing~~

~~2. Communications~~

~~ECGR 3112 Systems Analysis II~~
~~ECGR 4125 Foundation of Optical Engineering~~
~~ECGR 4132 Analog & Digital Communication~~
~~ECGR 4187 Data Communications~~
~~ITCS 3134 Digital Image Processing~~
~~ITCS 3166 Distributed Computer Info Systems~~
~~ITCS 4165 Coding and Information Theory~~

~~3. Device Electronics & Technology~~

~~ECGR 3133 Solid State Microelectronics I~~
~~ECGR 4125 Foundation of Optical Engineering~~
~~ECGR 4131 Linear Integrated Microelectronics~~
~~ECGR 4134 Solid State Microelectronics II~~
~~ECGR 4137 Device Electronics for ICs~~
~~ECGR 4138 Electronic Thin Film Devices~~
~~ECGR 4140 Intro to VLSI Processing~~
~~ECGR 4165 Laser Electronics~~

~~4. Computer Architecture/Software Systems~~

~~ECGR 4182 Digital System Testing~~
~~ITCS 2214 Data Structures~~
~~ITCS 3145 Intro to Parallel Programming~~
~~ITCS 3160 Data Base Design~~
~~ITCS 3183 Hardware System Design~~
~~ITCS 4141 Computer Organization & Architecture~~
~~ITCS 4181 Microcomputer Interfacing~~
~~ITCS 4183 Computer Arithmetic~~

1. Communication & Signal Processing

ECGR 3/4090 Spec Topics (approved case-by case)
ECGR 3112 System Analysis II
ECGR 4103 Applied Computer Graphics
ECGR 4123 Analog/Digit Communication
ECGR 4125 Foundation Optical Engineering
ECGR 4139 Digital Communication Systems
ECGR 4187 Data Communications
ECGR 4422 Random Processes

2. Hardware Systems

ECGR 3/4090 Spec Topics (approved case-by case)
ECGR 3133 Solidstate Microelec I
ECGR 3182 Digital Logic Dev

ECGR 4131	Linear Integrated Micro
ECGR 4132	Analog IC Design
ECGR 4134	Solidstate Micro II
ECGR 4137	Device Electronics for ICs
ECGR 4138	El thin Film Mtls Dev.
ECGR 4140	Intro VLSI Proc
ECGR 4142	Power System Analysis II
ECGR 4182	Digital Sys Test
ECGR 4188	Adv VLSI Design
ECGR 4433	VLSI Systems Design

3. Computer Architecture, Software, and Systems

ITCS 2214	Data Structure
ITCS 3145	Intro to Parallel Programming
ITCS 3166	Distributed Computing Systems
ECGR 3/4090	Spec Topics (approved case-by case)
ECGR 4102	Simulation
ECGR 4103	Applied Computer Graphics
ECGR 4111	Cont. Sys Theo I
ECGR 4112	Cont. Sys Theo II
ECGR 4161	Intro to Robotics
ECGR 4181	Computer Architecture
ECGR 4xxx	Video Game Design

CURRICULUM PLAN: B.S.Cp.E. DEGREE

Freshman Year

ENGL 1101 – Composition..... 3
ENGR 1201 - Intro to Engineering I..... 2
CHEM 1251 - Principles of Chemistry..... 3
CHEM 1251L - Principles of Chemistry Lab..... 1
ITCS 1214 - Introduction to Computer Science I..... 3
MATH 1241 - Calculus I..... 3
Total..... 15

ENGL 1102 - Writing in the Academic Community..... 3
ENGR 1202 - Intro to Engineering II..... 2
PHYS 2101 - Physics for Science/Engineering I..... 3
PHYS 2101L - Physics for Science/Engineering I Lab..... 1
ITCS 1215 - Introduction to Computer Science II..... 3
MATH 1242 - Calculus II..... 3
Total..... 15

Sophomore Year

ECGR 2111 - Network Theory I..... 3
ECGR 2155 - ECE Lab..... 1
ECGR 2181 - Logic System Design I..... 3
MATH 2171 - Differential Equations..... 3
PHYS 2102 - Physics for Science/Engineering II..... 3

PHYS 2102L - Physics for Science/Engineering II Lab..... 1
LBST 1101, 1102, 1103, 1104 or 1105..... 3
Total..... 17

ECGR 2112 - Network Theory II..... 3
ECGR 2156 - ECE Lab..... 1
ECGR 3181 – Logic System Design II..... 3
MATH 1165 - Intro to Discrete Structures..... 3
STAT 2122 - Probability and Statistics..... 3
ECON 2101- Principles of Economics – Macro..... 3
Total..... 16

Junior Year

ECGR 3111 - Signals and Systems..... 3
ECGR 3131 - Fund. of Electronics/Semiconductors..... 3
ECGR 3155 – ECE Lab..... 1
ENGR 3295 - Professional Development..... 1
ECGR 3183 – Computer Org and Prog. Languages..... 3
LBST 2101 - Western Cultural & Historical Awareness..... 3
LBST 221X..... 3
Total..... 17

ECGR 2255 – ECE Lab..... 2
ECGR 3123 - Data Communication & Network..... 3
ECGR 3132 – Electronics II..... 3
LBST 2102 - Global & Intercultural Connections..... 3
Advanced Problem Solving Selection..... 3
Restrictive Elective..... 3
Total..... 17

Senior Year

ECGR 3253 - Senior Project I..... 2
ECGR 4101 – Embedded Systems..... 3
ECGR 4146 – Intro to VHDL..... 3
Depth Elective #1..... 3
English Technical Writing –or– any 3-hour, 2xxx level
(or above) course with a Writing Intensive (W) designation..... 3
Total 14

ECGR 3254 - Senior Project II..... 3
ECGR 3159 - Professional Practice..... 2
ECGR 4124 – Digital Signal Processing..... 3
Depth Elective #2..... 3
Restrictive Elective..... 3
Total..... 14

Total Hours 125

The computer engineering website at http://www.ece.uncc.edu/cmpgr contains a wealth of information, including a complete student handbook and a facility for easily browsing required course prerequisite information. The students are strongly encouraged to review the website.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: February 2, 2007

RE: Request to edit course descriptions for Electrical Engineering Technology courses

The request to edit course descriptions for Electrical Engineering Technology courses was approved by the Chair of the Undergraduate Course & Curriculum Committee on January 30, 2007 for implementation Fall Semester, 2007.

Catalog Copy:

ETEE 1223. AC Circuit Analysis. (3) Prerequisite: ETEE 1123. Corequisite: MATH 1103. This course introduces AC electricity with an emphasis on circuit analysis, measurements, AC principles, circuit analysis laws and theorems, components and test equipment operation.

ETEE 2122. Electronic Drafting and Design. (2) Prerequisite: ETEE 1223. Corequisite: ETEE 2113. This course introduces computer-aided drafting (CAD) with an emphasis on application in the electronics field. Topics include electronics industry standards (symbols, schematic diagrams, layouts); drawing electronic circuit diagrams; electronic drafting practices and components such as resistors, capacitors, and ICs. Topics include editing, screen capturing, and cutting/pasting into reports.

ETEE 2133. Digital Circuits II. (3) Prerequisite ~~or co-requisite~~: ETEE 1213. Design and application of sequential circuits including flip-flops, counters, registers, and their interactions as state machines. Introduction to the architecture of microprocessors. Introduction to digital signal processing.

ETEE 2213. Introduction to Microprocessors. (3) Prerequisite: ETEE 1213. This course introduces microprocessor architecture and microcomputer systems including memory and input/output interfacing, assembly language programming, bus architecture, bus cycle types, I/O systems, memory systems, and interrupts.

ETEE 2243. Introduction to Control Systems. (3) Prerequisites: ETEE 1213 and ETEE 1223. The fundamental concepts of control, systems, sensors, actuator, and associated peripheral devices are covered, including rotating machine theory, ladder logic, electromechanical and solid state relays, motor controls, pilot devices, and PLC (programmable logic controllers), programming and networking.

ETEE 3124. Analysis of Linear Networks II. (4) Prerequisite: ETEE 3133 with a grade of C or better. Co-requisite: ETGR 3171. Circuit analysis utilizing network theorems and techniques in the frequency domain. 2^{nd} order responses. Two port network analysis and transfer functions. Bode plots; transformers and filter applications; introduction to Fourier analysis. Application of simulation software for circuit analysis.

ETEE 3133. Analysis of Linear Networks I. (3) Prerequisite: ETEE 1223 or AAS degree. Corequisites: MATH 1121 or ETGR 3171 and junior standing in ET department. Resistive circuits; current and voltage sources; Kirchoff's laws, network theorems, RC and RL circuits; waveform analysis and synthesis; time domain circuit analysis; 1^{st} order natural and forced responses; Laplace Transform fundamentals. Circuit transformations. Intro to frequency domain circuit analysis. Application of simulation software for circuit analysis.

ETEE 3153. ELET Laboratory V. (1) (W) Corequisites: ETEE 3133 and ETEE 3183. Experiments which support concepts and practice covered in ETEE 3133 and ETEE 3183. Three laboratory hours per week.

ETEE 3156. ELET Laboratory VI. (1) (W) Corequisite: ETEE 3124. Experiments with support concepts and practice covered in ETEE 3124. Three laboratory hours per week.

ETEE 3183. Digital Logic Design. (3) Prerequisite: ETEE 1213 or AAS degree and junior standing in ET department. Design of combinational and sequential digital logic circuits. Minimization methods and state assignment techniques. Circuit implementation using MSI, LSI, and programmable circuits. Introduction to computer architecture.

ETEE 3211. Active Networks I. (3) Prerequisite: ETEE 3124 with a grade of C or better and ETGR 3171. Rectifiers; amplifiers analysis; transistor biasing; small signal models; feedback amplifier analysis; amplifier frequency response.

ETEE 3212. Active Networks II. (3) Prerequisite: ETEE 3211 with a grade of C or better. Amplifier frequency response (continued); feedback amplifier frequency response; operational amplifiers and applications.

ETEE 3255. ELET Laboratory VII (Computer Emphasis). (1)
(W) Corequisite: ETEE 3211. Experiments which support concepts and practice covered in ETEE 3211. Three laboratory hours per week.

ETEE 3257. ELET Laboratory VII (Electronics Emphasis). (1)
(W) Corequisite: ETEE 3211. Experiments which support concepts and practice covered in ETEE 3211. Three laboratory hours per week.

ETEE 3260. Opto-Electronic Communications Laboratory. (1)
(W) Corequisite: ETEE 3230, ETEE 3240, senior status in ET or permission of department. Opto-electronic Communications system measurements, instrumentation, and applications. Experiments support concepts and practice covered in ETEE 3230 and 3240. *(On demand)*.

ETEE 3281. Computer Design. (3) Prerequisite: ETEE 1213 or AAS degree and junior standing in ET department. Co-requisite: ETEE 3183. Organization and design approaches for computer network systems. LAN design, hardware and software considerations, network operating systems, TCP/IP fundamentals.

ETEE 3285. Assembly-Language Programming. (3) Prerequisite: ETEE 1213 or AAS degree and junior standing in ET department. Co-requisite: ETEE 3183. Programming methodology and assembly language programming for the MC6800 series microprocessors.

ETEE 3286. Microcomputer Applications. (3) Prerequisite: ETGR 2122 or AAS degree and junior standing in ET department. Applied programming of microcomputers for engineering applications using Java. Object-oriented program design methods, Graphical user interfaces for data input and output, computer graphics, and computer animation.

ETGR 2122. Technical Programming. (3) This course introduces computer programming using a high level programming language as related to engineering technology. Topics include input/output operations, sequence, selection, iteration, arithmetic operations, arrays tables, and pointers.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: February 2, 2007

RE: Request to edit course descriptions for ECGR 4193 & ECGR 4186

The request to edit course descriptions for ECGR 4193 & ECGR 4186 was approved by the Chair of the Undergraduate Course & Curriculum Committee on January 30, 2007 for implementation Fall Semester, 2007.

Catalog Copy:

ECGR 4193. ~~Foundation of~~ Experiments in Modern Optical Engineering. (3) ~~Cross listed as ECGR 5125~~. Prerequisites ECGR 4125/5125 and

ECGR 4165/5165 or permission of department. This course offers lectures and laboratory experiments in lasers, optical fiber, optical sensing, and optical signal processing. This course is offered as supplement to ECGR 4125/5125 and ECGR 4165/5165 with emphasis on hands on experiments, measurements, and design.

ECGR 4186. ~~Foundation of Optical Engineering~~ Optical Communication and Optical Signals. (3) Prerequisites: ECGR 4125/5125 or permission of the Department. The course covers the fundamentals of modern optical networks, optical systems, and protocols. These include transmission, detection, multiplexing/demultiplexing and related prevailing technology.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: February 2, 2007

RE: Request to edit prerequisites for ECGR 3159

The request to edit prerequisites for ECGR 3159 was approved by the Chair of the Undergraduate Course & Curriculum Committee on January 230, 2007 for implementation Fall Semester, 2007.

Catalog Copy:

ECGR 3159. Professional Practice. (2) Prerequisite: ~~ENGR 3295.~~ Senior standing in engineering. Ethics; safety and liability in the manufacturing workplace; product design; product development; cost estimating for non-recurring engineering work; production planning; Total Quality Management; and effective technical presentation. *(Spring, Summer)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: October 27, 2006

RE: Request to change prerequisites for Electrical and Computer Engineering Courses

The request to change prerequisites for Electrical and Computer Engineering Courses was approved by the Chair of the Undergraduate Course and Curriculum Committee on October 24, 2006 for implementation Fall Semester, 2007.

Catalog Copy:

ECGR 2111. Network Theory I. (3) Co-requisites: ECGR 2155, MATH 2171, PHYS 2102, or permission of the Department. Prerequisite: MATH 1242 and PHYS 2101 **both with a grade of C or better**. Introduction to Kirchoff's laws and terminal equations. Circuit analysis techniques and network theorems. Singularity functions and signals. Transient and natural response of first and second order networks. State variable analysis. *(Fall, Spring) (Evenings)*

ECGR 2155. Logic and Networks Laboratory. (1) (W) Prerequisites: ~~MATH 1241 and~~ 1242 **with a grade of C or better**. Corequisites: ECGR 2111 and 2181 or permission of Department. Network measurements and applications, experimental logic design; introduction to laboratory equipment and techniques. *(Fall, Spring, Summer) (Evenings)*

ECGR 2181. Logic System Design I. (3) Prerequisite: MATH ~~1241~~ **1242 with a grade of C or better** or permission of the Department. Corequisite: ECGR 2155 or permission of the Department. Introduction to Boolean algebra; mixed logic; design of combinational circuits; introduction to sequential systems; MSI building blocks; includes laboratory design projects. *(Fall, Spring)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: October 27, 2006

RE: Request to add labs to ETCE 1211, 1222, & 2112

The request to add labs to ETCE 1211, 1222, & 2112 was approved by the Chair of the Undergraduate Course and Curriculum Committee on October 24, 2006 for implementation Fall Semester, 2007.

Catalog Copy (new courses are highlighted):

ETCE 1211. Surveying I. (3) Prerequisite or corequisite: MATH 1103. **Corequisite: ETCE 1211L.** An introductory field surveying and site planning course covering standards, units, and calibration of equipment, measurement of distance, elevation, angles, and analysis of systematic and random errors in the measurement, adjustments of measurements, weighting, and principle of least squares. Two hours of lecture ~~and three hours of laboratory~~ per week. *(Spring)*

ETCE 1211L. Surveying I Laboratory. (0) Prerequisite or corequisite: MATH 1103. Co-requisite: ETCE 1211. Laboratory supporting ETCE 1211. Three hours of laboratory per week. *(Pass/No Credit grading) (Spring)*

ETCE 1222. Construction Materials. (3) Corequisite: ETCE 1222L. Study of the behavior and physical properties of basic construction materials. Topics include mineral aggregates, Portland cement concrete, masonry, wood, asphalt concrete, metals, plastics, and other materials. Two hours of lecture ~~and three hours of laboratory~~ per week. *(Spring)*

ETCE 1222L. Construction Materials Laboratory. (0) Corequisite: ETCE 1222. Laboratory supporting ETCE 1222. Three hours of laboratory per week. *(Pass/No Credit grading) (Spring)*

ETCE 2112. Construction Surveying and Layout. (3) Prerequisites: **CMET 1211**, ~~ETCE 1211~~, ETGR 1103. **Corequisite: ETCE 2112L.** An

intermediate surveying and site-planning course covering plane survey, design and layout of horizontal and vertical curves, direction and traversing, design of site plant, control of grading, and global positioning system. Two hours of lecture and ~~three hours of laboratory~~ per week. *(Fall)*

ETCE 2112L. Construction Surveying and Layout Laboratory. (0)
Prerequisites: CMET 1211, ETGR 1103. Corequisite: ETCE 2112. Laboratory supporting ETCE 2112. Three hours of laboratory per week. *(Pass/No Credit grading) (Fall)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: October 30, 2006

RE: Request to change prerequisites and co-requisites for Mechanical Engineering and Engineering Science Curriculum

The request to change prerequisites and co-requisites for Mechanical Engineering and Engineering Science Curriculum was approved by the Chair of the Undergraduate Course and Curriculum Committee on October 24, 2006 for implementation Fall Semester, 2007.

Catalog Copy:

MEGR 2240. Computational Methods for Engineers. (3) Prerequisites: MEGR 2141 **with a grade of C or better** and MATH 2241. Automated engineering analysis and synthesis techniques based on software engineering principles. Overview of data representation and computing languages. Program development using programming languages and off-the shelf software packages. Study of numerical methods, potential errors, and computational stability. emphasis on effective design, testing, and debugging practices. *(Fall, Spring)*

MEGR 3122. Dynamic Systems II. (3) Prerequisites: **MEGR 2240,** MEGR 3121 and MATH 2171, ~~both~~ **all** with a grade of *C* or better. Modeling of mechanical dynamic

systems. Vibration of lumped mass systems. Analysis and design of mechanical systems using time domain and frequency domain methods.

MEGR 3156. Design Projects Lab II. (2) Prerequisites: ECGR 2161, MEGR 2144, and MEGR 2156 all **with a grade of C or better**. Study of the process of design and reduction to practice of engineering concepts in a team environment. Requirements definition, concept synthesis, concept of evaluation, project planning and execution.

MEGR 3161. Introduction to Engineering Materials. (3) Prerequisites: CHEM 1251 ~~and~~ MATH 2171, and MEGR 2144 with a grade of C or better. Classifications of engineering materials. Introduction to property structure relationships. Ideal and defect atomic structures of solids with examples from metals, ceramics and polymers. Cold working and annealing effects. Phase equilibria in alloys; introduction to diffusional processes and transformation kinetics.

MEGR 3171L. Instrumentation Laboratory. (2) (W) Prerequisite: PHYS 2102L with a grade of *C* or better. Co-requisite: MEGR 3171. Utilization of measuring equipment targeted to mechanical engineering applications. Experiments will focus on the use of instrumentation and computer interfacing methods for the optimization of measurement processes. Basic programming of scientific instruments.

MEGR 3255. Senior Design I. (2) Prerequisite: MEGR 3156 **and MEGR 3152** with a grade of *C* or better. Co-requisite: ~~MEGR 3152~~, MEGR 3251 and senior standing in mechanical engineering. First of a two-semester sequence leading to a major integrative experience in applying the principles of design and project management to the design of a major mechanical engineering system. Teamwork and communication skills are emphasized.

MEGR 3355. Motorsports Engineering Clinic II. (2) Prerequisite: admission to Motorsports concentration, senior standing in mechanical engineering, MEGR 2299 and MEGR 3156, **and MEGR 3152 all** ~~both~~ with a grade of *C* or better. Co-requisite: ~~MEGR 3152 and~~ MEGR 3251. First of a two-semester sequence leading to a major integrative experience in applying the principles of design and project management to the design of an automotive engineering system. Teamwork and communication skills are emphasized. An examination of various aspects of automotive and motorsports engineering presented by faculty and industry representatives.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: October 30, 2006

RE: Request to change prerequisites and co-requisites for Mechanical Engineering Technology Curriculum

The request to change prerequisites and co-requisites for Mechanical Engineering Technology Curriculum was approved by the Chair of the Undergraduate Course and Curriculum Committee on October 24, 2006 for implementation Fall Semester, 2007.

Catalog Copy:

ETGR 2106. ~~Electrical~~ AC & DC Circuits. (3) Prerequisite**s**: **PHYS 1102**, MATH ~~1103~~ **1100**. This course provides an introduction to AC and DC circuits. Simple series and series-parallel circuits will be used to illustrate applications of Ohm's Law and Kirchhoff's Laws. Power in DC resistive circuits will be discussed. Sine waves, complex numbers and phasors will be introduced to show their applications to analysis of AC circuits. Capacitors and inductors and their effects will be covered.

ETGR 3272. Applied Numerical Methods. (3) Prerequisites: ~~ETGR 3071~~, **ETGR 2122** or a course in programming using a higher level language, ETGR 3171. Numerical methods for the solution of engineering problems on the digital computer. Emphasis on applications to civil and mechanical engineering technology, using both commercial and student written programs.

ETME 2101. Applied Materials. ~~(4)~~ (3) Prerequisite: MATH 1103. This course introduces the student to materials and to the concept that materials are designed to provide the desired properties in the same way that the parts themselves are designed. The students will learn to understand that the processes we use to change materials into the geometries we want for also change the properties of the materials. The course intends to approach materials from a design and manufacturing perspective.

ETME 2102. Mechanisms. (3) Prerequisites: ~~ETGR 1104, PHYS 1102~~ **ETGR 1103, PHYS 1101**. This course covers plane motion and devices used to generate plane motion. Topics include analysis of displacement, velocity, acceleration, gears, cams and other mechanical systems. *(Spring)*

ETME 2156 Machine Shop Practices (2) and ETME 2156L Machine Shop Practices Lab. (1) Prerequisite~~s~~: ~~ETME 1101, ETME 2101, ETME 1102~~ **ETGR 1103**. This course introduces students to machine shop techniques and designing for machining with a combination of lectures and projects. Students will learn design for machining guidelines, about specification of machining operations, and about shop measurement instruments and techniques. *(Spring)*

ETME 2202. Introduction to Mechanical Design. (2) Prerequisites: ETGR 1104, ETGR ~~1202~~ **1201**. This course introduces mechanical design techniques using computer based parametric modeling tools such as Autodesk Inventor. Topics include feature based solid modeling, design constraints, assemblies, mechanisms, animations, and design documentation via technical drawings. Proficiency is demonstrated by an end-of-term design project. *(Fall)*

ETME 3113. Dynamics. (3) Prerequisites: ~~statics, differential and integral calculus~~ **MATH 1121, ETGR 2101, and ETME 2102.** The dynamic behavior of particles; translation, rotation and plane motion of a rigid body, the principles of conservation of energy and momentum.

ETME 3123. Strength of Materials. (3) Prerequisites: ~~statics, differential and integral calculus~~ **ETGR 2101 with a C or better. Co-requisite: MATH 1121.** Stress-strain relationships resulting from direct loads, torsional loads and bending loads, and the results obtained from applying more than one of these loads simultaneously. Beam deflection and column loading.

ETME 3143. Thermodynamics. (3) Prerequisite~~s or corequisites: differential and integral calculus~~ **MATH 1121.** Fundamentals of thermodynamics including work and heat; classical approach to first and second laws of thermodynamics; ideal gas, entropy, reversibility, irreversibility, and study of various processes and cycles.

ETME 3163. Instrumentation and Controls. (3) Prerequisite: ETGR 2106. Introduction to instrumentation for measurement and control of physical variables, with emphasis on electronic systems. Review of basic circuit analysis,

electrical instruments, sensors and measurement principles and a survey of automatic controls from a systems point of view.

ETME 3213. Machine Design I. (3) Prerequisite: **ETME 2101,** ETME 3123~~.~~ ~~Prerequisite or corequisite: ETME 3113~~. Analysis and design of clutches, brakes, belts and roller chain. Indeterminate normal loading, superposition of stresses and deflections, compound stresses, columns and fatigue. Theories of failure. Shaft design, deflections of shafts with nonuniform moments of inertia involving computer verification. Antifriction bearings, engineering materials, helical compression springs. Small mechanical component and system designs.

ETME 3232. Senior Design Project I. (2) Prerequisites: **ETME 3113, 3133, and** 3143. Corequisite or prerequisite: **ETME 3213** or permission. First of a two-semester course sequence in which each student proposes and implements a senior-level design project which demonstrates abilities as developed by the coursework taken thus far. Each student uses project planning techniques to complete a project proposal and plans and makes substantial progress toward implementation in the first semester and completes the project, including design evaluation during the second semester. One class hour and three lab hours per week.

ETME 3242. Senior Design Project II. (2) **Prerequisite: ETME 3232. Pre- or Corequisite: ETME 3163.** Second of a two-semester course sequence in which each student proposes and implements a senior-level design project which demonstrates abilities as developed by the coursework taken thus far. Each student uses project planning techniques to complete a project proposal and plans and makes substantial progress toward implementation in the first semester and completes the project, including design evaluation during the second semester. One class hour and three lab hours per week.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: October 30, 2006

RE: Request to change the credit hours for ETME 1101 from (4) to (3)

The request to change the credit hours for ETME 1101 from (4) to (3) was approved by the Chair of the Undergraduate Course and Curriculum Committee on October 24, 2006 for implementation Fall Semester, 2007.

Catalog Copy:

ETME 1101. Manufacturing Processes. ~~(4)~~ **(3)** This course surveys and introduces common manufacturing processes and design for manufacture considerations. Student will be introduced to methods and equipment used to transform materials, and to the interdependency between geometry (form), materials properties, and processes and their effects on functionality of the manufactured artifact. Coverage will include processing of polymers, metals, and ceramics. The purpose of this course is to provide the students the conceptual understanding of materials processes.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: October 27, 2006

RE: Request to change prerequisites for ETCE 2112, 3131, and 4143

The request to change prerequisites for ETCE 2112, 3131, and 4143 was approved by the Chair of the Undergraduate Course and Curriculum Committee on October 24, 2006 for implementation Fall Semester, 2007.

Catalog Copy:

ETCE 2112. Construction Surveying and Layout. (3) Prerequisites: ~~CMET~~ **ETCE** 1211, ETGR 1103. An intermediate surveying and site-planning course covering plane survey, design and layout of horizontal and vertical curves, direction and traversing, design of site plant, control of grading, and global positioning system. Two hours of lecture and three hours of laboratory per week. *(Fall)*

ETCE 3131. Foundations and Earthwork. (3) Prerequisite: ETGR 210~~1~~**2** or AAS degree. Study of basic design and construction of foundations. Background theories are generally introduced in concise forms as formulas or charts. Emphasis on practical aspects of foundation design and earthwork construction. *(Fall)*

ETCE 4143. Water and Wastewater Systems. (3) Prerequisite: ETCE 3242 **and CHEM 1111 or CHEM 1251**. Study of water supply, treatment, and distribution and liquidwaste disposal systems. *(Fall)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: October 25, 2006

RE: Request to correct the credit hours from 2 to 3 in the course description for CEGR 2102

The request to correct the credit hours from 2 to 3 in the course description for CEGR 2102 was approved by the Chair of the Undergraduate Course and Curriculum Committee on October 24, 2006 for implementation Fall Semester, 2007.

Catalog Copy:

CEGR 2102. Engineering Economic Analysis. ~~**(2)**~~ **(3)** Prerequisite: ENGR 1201. Economic analysis of engineering solutions; present and annual worth analysis; cost benefit analysis; internal rate of return analysis; bonds and cost estimating. Three hours per week. *(Fall)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: October 11, 2006

RE: Request to establish a B.S. in Construction Management

The request to establish a B.S. in Construction Management was approved by the Board of Governors on June 9, 2006 for implementation Spring Semester, 2007.

Catalog Copy:

Course numbering will be modified for the following existing courses to reflect a consistent numbering sequence in the program:

Revised Course Number	Former Course Number	Course Name
ETCE 3123	ETCE 3281	Cost Estimating
ETCE 3131	ETCE 3121	Foundations & Earthwork
ETCE 3131L	ETCE 3151	Soil Testing Laboratory
ETCE 3163	ETCE 3111	Structural Analysis & Design
ETCE 3271	ETCE 3293	Building Systems
ETCE 3242	ETCE 3132	Hydraulics & Hydrology
ETCE 3242L	ETCE 3150	Hydraulics Laboratory
ETCE 3264	ETCE 3112	Structural Analysis II
ETCE 4126	ETCE 3243	Project Scheduling & Control
ETCE 4126L	ETCE 3253	Construction Practices Laboratory

ETCE 4143	ETCE 3262	Water & Wastewater Systems
ETCE 4143L	ETCE 3252	Environmental Laboratory
ETCE 4165	ETCE 3212	Structural Steel Design
ETCE 4251	ETCE 3241	Highway Design & Construction
ETCE 4251L	ETCE 3154	Asphalt Mixtures Laboratory
ETCE 4266	ETCE 3211	Reinforced Concrete Design
ETCE 4272	ETCE 3642	Capstone Project

Catalog Copy for Construction Management Courses:

CMET 1680. Professional Development I. (1) Prerequisite: Open to freshman level Civil Engineering Technology and Construction Management majors. Seminar discussing professional development issues relating to the civil engineering technology and construction management professions. One hour per week. *(Pass/No Credit grading)(Spring)*

CMET 2680. Professional Development II. (1) Prerequisite: Open to sophomore level Civil Engineering Technology and Construction Management majors. Seminar discussing professional development issues relating to the civil engineering technology and construction management professions. One hour per week. *(Pass/No Credit grading) (Spring)*

CMET 3224. Construction Project Administration. (3) Prerequisite: Junior Standing or AAS degree. A study of the project management processes used in the design and construction of civil engineering projects. Topics include the roles and responsibilities of project participants, project delivery methods, engineering and construction contracts, project control and documentation, and dispute resolution mechanisms. *(Spring)*

CMET 3680. Professional Development III. (1) Prerequisite: Open to junior level Construction Management majors. Seminar discussing professional development issues relating to the civil engineering technology and construction management professions. One hour per week. *(Pass/No Credit grading) (Spring)*

CMET 4073. Special Topics – Construction Management. (1-4) Prerequisite: senior standing and consent of instructor. A study of new and emerging technical topics pertinent to the field of construction management. May be repeated for credit. *(On demand)*

CMET 4125. Construction Codes and Contract Documents. (2) Prerequisites: Junior Standing or AAS degree. An analysis of construction contract documents, building codes, permits, and specifications. *(Fall)*

CMET 4127. Construction Law and Regulatory Issues. (3) Examination of the legal problems encountered by architects, engineers, contractors, owners, sureties, and lenders involved in the construction process. Special emphasis on the legal rights and liabilities of the various participants in construction projects. Claims preparation, negotiation, arbitration, and litigation methods of dispute resolution. *(On demand)*

CMET 4228. Construction Office Operations. (2) Prerequisite: CMET 3224. A study of management issues encountered in home and job-site office operations. Topics include construction safety, insurance and risk management, labor relations, procurement, cost accounting, subcontracting, and labor and equipment resource allocation and management. *(Spring)*

CMET 4272. Capstone Project. (2) (W,O) Prerequisite: Senior standing in Construction Management and consent of the Department. Utilization of students' previous course work to creatively investigate and produce solutions for a comprehensive construction management project. *(Spring)*

CMET 4680. Professional Development IV. (1) Prerequisite: Open to senior level Construction Management majors. Seminar discussing professional development issues relating to the civil engineering technology and construction management professions. One hour per week. *(Pass/No Credit grading) (Spring)*

Catalog Copy for Civil Engineering Technology Courses

ETCE 1121. Construction Methods. (3) An introduction to the basic construction methods and operations used on civil engineering projects. Topics include basic construction and civil engineering terminology, identification and selection of construction equipment and techniques, and an overview of the components and processes used in the construction of concrete, steel, and wood-framed structures. *(Fall)*

ETCE 1211. Surveying I. (3) Prerequisite or Corequisite: MATH 1103. An introductory field surveying and site planning course covering standards, units, and calibration of equipment, measurement of distance, elevation, angles, and analysis of systematic and random errors in the measurement, adjustments of measurements, weighting, and principle of least squares. Two hours of lecture and three hours of laboratory per week. *(Spring)*

ETCE 1222. Construction Materials. (3) Study of the behavior and physical properties of basic construction materials. Topics include mineral aggregates, Portland cement concrete, masonry, wood, asphalt concrete, metals, plastics, and other materials. Two hours of lecture and three hours of laboratory per week. *(Spring)*

ETCE 2112. Construction Surveying and Layout. (3) Prerequisites: CMET 1211, ETGR 1103. An intermediate surveying and site-planning course covering plane survey, design and layout of horizontal and vertical curves, direction and traversing, design of site plant, control of grading, and global positioning system. Two hours of lecture and three hours of laboratory per week. *(Fall)*

ETCE 2410. Introduction to Environmental Engineering Technology. (3) Prerequisites: MATH 1103, ETGR 1201. This course is designed to serve as an introduction to environmental engineering technology. The course will provide an overview of the environmental field to include laws and regulations, water quality, hydraulic and hydrologic fundamentals, water and wastewater treatment, groundwater contamination, and solid waste management. *(Spring)*

ETCE 3123. Cost Estimating. (3) Prerequisites: ETCE 1222, ETCE 2112 or AAS degree or Departmental approval. Methods used to determine material quantities, labor and equipment requirements, and costs associated with construction activities and projects. *(Fall)*

ETCE 3131. Foundations and Earthwork. (3) Prerequisite: ETGR 2101 or AAS degree. Study of basic design and construction of foundations. Background theories are generally introduced in concise forms as formulas or charts. Emphasis on practical aspects of foundation design and earthwork construction. *(Fall)*

ETCE 3131L. Soil Testing Laboratory. (1) (W) Prerequisite or Corequisite: ETCE 3131. Laboratory designed to familiarize the student with the common laboratory soil tests and analysis procedures with emphasis on the significance of the various tests, the testing procedures and the

detailed computations. Three laboratory hours per week. *(Fall)*

ETCE 3163. Structural Analysis and Design I. (3) Prerequisite: ETGR 2102 or AAS degree. Basic concepts and principles of structural analysis and design. Emphasis on practical aspects of structural analysis and design to include beams, columns, trusses, frames, and temporary structures for construction projects. *(Fall)*

ETCE 3163L. Structures and Materials Laboratory. (1) (W) Prerequisite or Corequisite: ETCE 3163. Laboratory designed to evaluate structural materials commonly encountered in the civil and construction environments. Basic beam, truss and frame experiments will be conducted. Standard laboratory and field tests for typical materials such as block, brick, asphalt, concrete, steel and timber will be performed. Three laboratory hours per week. *(Fall)*

ETCE 3242. Hydraulics & Hydrology. (3) Prerequisites: ETGR 2102, ETCE 2410 or AAS degree. A study of the fundamental principles of hydraulics and their application in engineering practice, including the fundamentals of fluid flow through orifices, tubes and pipes, in open channels, and over weirs, pump design, network analysis, and modeling. *(Spring)*

ETCE 3242L. Hydraulics Laboratory. (1) (W) Prerequisite or Corequisite: ETCE 3242. Laboratory designed to provide the student with an understanding of the apparatus, techniques, and procedures used to measure hydraulic fluid properties and to verify the fundamentals of fluid flow through orifices, tubes and pipes, in open channels, and over weirs. Three laboratory hours per week. *(Spring)*

ETCE 3264. Structural Analysis II. (3) Prerequisites: ETCE 3163, MATH 1121. Deflection of structures. Analysis of statically determinate structures under fixed and moving loads, influence lines for moving loads. Analysis of statically indeterminate structures using the methods of three-moments, consistent distortions, slope deflection, moment-distribution and approximate analysis. An introduction to matrix methods of structural analysis. *(Spring)*

ETCE 3271. Building Systems. (3) Prerequisite: ETCE 2410. Basic theory and practical application of heating, ventilation, air conditioning, plumbing and electrical systems in construction. Study of National Fire and Plumbing Codes. *(Spring)*

ETCE 3271L. Building Systems Laboratory. (1) (W) Prerequisite or Corequisite: ETCE 3271. Laboratory exercises demonstrating the basic theory and practical application of heating, ventilation, air conditioning, plumbing and electrical systems in construction. Three laboratory hours per week. *(Spring)*

ETCE 4073. Special Topics – Civil Engineering Technology. (1-4) Prerequisite: senior standing and consent of instructor. A study of new and emerging technical topics pertinent to the field of civil engineering technology. May be repeated for credit. *(On demand)*

ETCE 4126. Project Scheduling and Control. (3) Prerequisite: ETCE 3123. Planning, scheduling, and monitoring construction projects, including development of critical path networks, Gannt bar charts, construction cost control, and reporting practices. *(Fall)*

ETCE 4126L. Construction Practices Laboratory. (1) (W) Prerequisite or Corequisite: ETCE 4126. A synthesis of prior work using fundamental scheduling and cost estimating principles as applied in a directed project. Three laboratory hours per week. *(Fall)*

ETCE 4143. Water and Wastewater Systems. (3) Prerequisite: ETCE 3242. Corequisite: CHEM 1203. Study of water supply, treatment, and distribution and liquidwaste disposal systems. *(Fall)*

ETCE 4143L. Environmental Laboratory. (1) (W) Prerequisite or Corequisite: ETCE 4143. Laboratory on the analysis of water and sewage and problems related to environmental control. Three laboratory hours per week. *(On demand)*

ETCE 4165. Structural Steel Design. (3) Prerequisite: ETCE 3163. Design of beams and columns, floor framing, tensions and compression members, bolted and welded connections according to AISC specifications. *(Fall)*

ETCE 4251. Highway Design and Construction. (3) Prerequisite: ETCE 2112 or AAS degree. Introduction to highway planning, economic considerations, and traffic engineering. Design and construction of modern highways including grade separations and interchanges. *(Spring)*

ETCE 4251L. Asphalt Mixtures Laboratory. (1) (W) Prerequisite or Corequisite: ETCE 4251. Study of physical properties of asphalt, of aggregates and their combinations, principles and practice in the design, construction and control of asphalt mixtures; laboratory tests for asphalts, aggregates, and mixture design, including specimen preparation and stability evaluation. Three laboratory hours per week. *(On demand)*

ETCE 4266. Reinforced Concrete Design. (3) Prerequisite: ETCE 3163. Design of rectangular beams, T-beams, columns, reinforced concrete floor systems, and reinforced concrete footings according to ACI code. Quality control of concrete and structural inspection. *(Spring)*

ETCE 4272. Capstone Project. (2) (W,O) Prerequisite: Senior standing in Civil Engineering Technology or consent of the Department. Utilization of students' previous course work to creatively investigate and produce solutions for a comprehensive civil engineering technology project. *(Spring)*

ETCE 4344. Applied Hydrology and Storm Water Management. (3) Prerequisite: ETCE

3242. Treatment of hydrologic principles, prediction of runoff, design of storm water systems and controls, and the application of best management practices. *(On demand)*

ADDITIONAL CATALOG COPY

Ø *On Page 131, right column, modify 3rd paragraph to read as follows:*

UNC Charlotte offers four curricula leading to a Bachelor of Science in Engineering Technology (BSET) degree: **Civil Engineering Technology**; **Electrical Engineering Technology** (with emphases in Electronics Engineering Technology or Computer Engineering Technology); **Fire Safety Engineering Technology**; and **Mechanical Engineering Technology**. UNC Charlotte also offers a curriculum leading to a Bachelor of Science in **Construction Management** (BSCM) degree.

Ø *On Page 131, right column, modify last sentence of the 4th paragraph, to read as follows:*

Ø Incoming students with an AAS degree generally receive Junior class standing, with 64 semester credit hours applied toward the BSET or BSCM degree.

Ø *On Page 134, left column, delete the existing Civil Engineering Technology Program curriculum outlines for both the general and construction emphasizes and replace with the following:*

CIVIL ENGINEERING TECHNOLOGY PROGRAM

(Effective Fall 2006)

The Civil Engineering Technology program shares a common curriculum with the Construction Management program for the first two years. Students may move between the common programs until the junior year when the curricula diverge. At the end of the sophomore year, students must select either the analysis and design oriented Civil Engineering Technology BSET degree or the management-oriented BSCM program. A.A.S. transfer students from approved programs will receive 64 credit hours for the A.A.S. degree; thus, A.A.S. students need only to complete the upper-division portion of the curriculum listed below and remediate any entrance deficiencies noted upon matriculation. The curriculum is outlined below for both entering Freshmen and A.A.S. transfer students

Freshman Year

ETCE 1121 Construction Methods 3

ENGL 1101 English Composition or ENGL 1103

Accelerated College Writing & Rhetoric 3

ETGR 1100 Engineering Computer Applications 3

ETGR 1201 Intro. to Engineering Technology 2

ETGR 1103 Technical Drawing I.....2

MATH 1100 College Algebra and Probability 3

ETCE 1211 Surveying I.....3

ETCE 1222 Construction Materials 3

CMET 1680 Professional Development I 1

ENGL 1102 Writing in the Academic Community

or Writing Elective(2) 3

ETGR 1104 Technical Drawing II 2

MATH 1103 Precalculus Math for Science & Eng.....3

Sophomore Year

ETCE 2112 Construction Surveying & Layout 3

ETGR 2101 Applied Mechanics I 3

GEOL 1200 Physical Geology or CHEM 1111 or 1251.....3

MATH 1121 ET Calculus.....3

PHYS 1101 Introductory Physics I 3

PHYS 1101L Introductory Physics I Laboratory.....1

ETCE 2410 Intro. Environmental Eng. Technology.....3

CMET 2680 Professional Development II 1

ETGR 2102 Applied Mechanics II 3

PHYS 1102 Introductory Physics II 3

PHYS 1102L Introductory Physics II Laboratory 1

STAT 1220 Elements of Statistics I.....3

Directed Elective(3) 3

Junior Year

ETCE 3131 Foundations & Earthwork 3

ETCE 3131L Soil Testing Laboratory (W) 1

ETCE 3163 Structural Analysis & Design I 3

ETCE 3163L Structures & Material Laboratory (W) 1

ETGR 3222 Engineering Economics.....3

Directed Elective(3) 3

ETGR 3071 ET Professional Seminar.....1

CMET 3224 Construction Project Administration.....3

ETCE 3242 Hydraulics and Hydrology 3

ETCE 3242L Hydraulics Laboratory (W) 1

ETCE 3264 Structural Analysis II 3

CMET 3680 Professional Development III.....1

ETGR 3171 Engineering Analysis I 3

Directed Elective(3) 3

Senior Year

CHEM 1111 or CHEM 1251 or GEOL 1200 3

CHEM 1111L or CHEM 1251L or GEOL 1200L.....1

ETCE 4143 Water and Wastewater Systems 3

Major Elective Laboratory (W) (4) 1

ETCE 4165 Structural Steel Design.....3

Directed Elective(3) 3

Major Elective(4) 3

ETCE 4251 Highway Design & Construction 3

ETCE 4266 Reinforced Concrete Design 3

ETCE 4272 Capstone Project (W,O) 2

CMET 4680 Professional Development IV 1

Directed Elective(3) 3

Major Elective(4) 3

TOTAL CREDIT HOURS = 128

CIET Curriculum Outline Footnotes:

(1) Course selected based on Math Placement Test.

(2) Writing elective available upon successful completion of ENGL 1103.

(3) Directed electives may be major field courses or general education courses. They are chosen jointly by student and advisor to ensure that all graduation requirements are met. Non AAS degreed students must satisfy University and CIET general education requirements. AAS degreed students must satisfy CIET general education requirements.

(4) Major elective courses must be courses within the Department of Engineering Technology and approved by the faculty.

On Page 137, append the following text to the end of the existing catalog copy :

BACHELOR OF SCIENCE IN CONSTRUCTION MANAGEMENT (BSCM)

Starting in the 2006-07 academic year the Department of Engineering Technology will be offering a new degree program leading to the Bachelor of Science in Construction Management (BSCM). Students for this degree may enter as freshmen commencing the 2006-07 academic year. Transfer students from technical or community college with appropriate AAS degrees will also be admitted.

Requirements for Admission. Applicants for this program may enter directly after completing high school or may enter with 64 credit hours for an Associate in Applied Science degree in Architectural, Civil, Construction or other similarly named Engineering Technology degree earned at a technical or community college and approved by the Department.

Freshman Admission: Applicants entering as freshmen must meet the University admission requirements.

Transfer Admission: Transfer applicants not having the Associate in Applied Science (AAS) degree or its equivalent must meet University admission requirements. Transfer applicants with AAS degrees must:

1. Hold an Associate of Applied Science degree in a field from among Architectural, Building Construction, Civil, Construction, Design and Drafting, or Surveying Technology or similar title with curriculum acceptable to the Department;

2. An overall grade point average of at least 2.2 (based on the 4.0 system) on all courses taken at the technical institute or community college; and

3. Have completed satisfactorily the prerequisite background courses for the program (a limited number of such background courses may be made up by taking them at UNC Charlotte).

Acceptance of the AAS degree indicates the acceptance of up to 64 hours toward the Bachelor of Science in Construction Management degree program only. These hours are not valid toward any other degree program in the University.

There is considerable variance in the contents of technical programs throughout the United States. Should this result in entrance deficiencies, the student can usually remove these deficiencies at a community or technical college prior to admission to UNC Charlotte, or during the first year at UNC Charlotte.

Residence Requirements. A student must earn the last 30 semester hours of credit toward the degree and the last 12 semester hours of work in the major at this University to satisfy residence requirements.

Academic Requirements and Discontinuance Conditions in Construction Management. In addition to University and College of Engineering conditions, a student who is admitted to the CM program without meeting ALL published admission requirements is expected to remove all admission deficiencies within one year. Violators are subject to discontinuance.

Course Requirements. Course requirements correspond to the mode of admission for each student as outlined hereafter.

1. Entering Freshmen: Students admitted as entering freshmen will complete the respective four year curriculum as described below.

2. Transfer students holding an AAS degree: Transfer students with an acceptable associate degree as defined previously under admission requirements begin the program at the junior year with up to 64 credit hours awarded. Prerequisites for students holding an acceptable associate degree from a community or technical college are listed below.

3. Transfer students not holding an associate degree: Transfer students not holding an AAS degree must complete the remaining coursework for the four year curriculum after transfer credit application.

Prerequisites for admission: Students must have satisfactorily completed the following subjects in their two year associate degree program:

English Composition and/or Technical Writing (6 semester hours)

Algebra and Trigonometry (6 semester hours)

Calculus and Statistics (6 semester hours)

Analytical Physical or Environment Science with laboratory (8 semester hours)

Macro Economics (3 semester hours)

Construction Methods (3 semester hours)

Construction Materials (3 semester hours)

Statics (3 semester hours)

Strength of Materials (3 semester hours)

Construction Surveying (3 semester hours)

Computer Aided Drafitng (3 semester hours)

Environmental Technology or Hydraulics or Hydrology (3 semester hours)

Engineering Technology Computing Applications (3 semester hours)

CURRICULUM OUTLINE

Construction Management Program

Freshman Year

ETCE 1121 Construction Methods 3

ENGL 1101 English Composition or ENGL 1103

Accelerated College Writing & Rhetoric 3

Construction B&M Core - ETGR 1100 (4) - Engineering

Technology Computer Applications 3

ETGR 1201 Intro. to Engineering Technology 2

ETGR 1103 Technical Drawing I.....2

MATH 1100 College Algebra and Probability or

MATH 1103 or MATH 1121(1) 3

ETCE 1211 Surveying I 3

ETCE 1222 Construction Materials 3

CMET 1680 Professional Development I 1

ENGL 1102 Writing in the Academic Community

or Writing Elective(2) 3

ETGR 1104 Technical Drawing II 2

MATH 1103 Precalculus Math for Science & Eng. or

MATH 1121 or Free Elective(3) 3

Sophomore Year

ETCE 2112 Construction Surveying & Layout 3

ETGR 2101 Applied Mechanics I 3

GEOL 1200 Physical Geology or CHEM 1111 or 1251.....3

MATH 1121 Calculus (ET) or Free Elective(3) 3

PHYS 1101 Introductory Physics I 3

PHYS 1101L Introductory Physics I Laboratory..... 1

ETCE 2410 Intro. Environmental Eng. Technology.....3

CMET 2680 Professional Development II 1

ETGR 2102 Applied Mechanics II 3

PHYS 1102 Introductory Physics II 3

PHYS 1102L Introductory Physics II Laboratory 1

STAT 1220 Elements of Statistics I.....3

Directed Elect./Construction B&M Core (4,5) – ECON 2101 ……..3

Junior Year

ETCE 3123 Cost Estimating 3

ETCE 3131 Foundations & Earthwork 3

ETCE 3131L Soil Testing Laboratory (W) 1

ETCE 3163 Structural Analysis & Design I 3

ETCE 3163L Structures & Materials Laboratory (W)...1

Construction B&M Core(4) - Accounting 2121 3

ETGR 3071 ET Professional Seminar.....1

CMET 3224 Construction Project Administration.....3

ETCE 3271 Building Systems 3

ETCE 3271L Building Systems Laboratory (W).....1

CMET 3680 Professional Development III.....1

Construction B&M Core - ETGR 3222(4) - Engineering

Economics ……...……..……..……...3

Construction B&M Core(4) - Accounting 2122 3

Directed Elective(5) 3

Senior Year

CMET 4125 Construction Codes and Documents 2

ETCE 4126 Project Scheduling and Control 3

ETCE 4126L Construction Practices Laboratory (W)....1

Construction B&M Core(4) - BLAW 3150.....3

Directed Elective(5) 3

Directed Elective(5) 3

CMET 4228 Construction Office Operations 2

CMET 4272 Construction Capstone Project (W,O) 2

CMET 4680 Professional Development IV 1

ETCE 4251 Highway Design & Construction 3

Core Elective (6) - Technical or Construction B&M 3

Directed Elective(5) 3

Construction B&M Core (4) - MGMT 3140..... 3

TOTAL CREDIT HOURS = 128

Curriculum Outline Footnotes:

(1) Course selected based on Math Placement Test.

(2) Writing elective available upon successful completion of ENGL 1103.

(3) Free elective available upon successful completion of MATH 1121.

(4) Completion of the Construction B&M (business/management) Core is required: ETGR 1100; ECON 2101; ETGR 3222; ACCT 2121; ACCT 2122; BLAW 3150; and MGMT 3140. ECON 2101 doubles as Construction B&M Core and Social Science Elective in sophomore year. ETGR 1100 and ETGR 3222 serve as replacement prerequisites to INFO 2130 and ECON 2102 for Construction students taking MGMT 3140 and FINN 3120 (core elective). Construction B&M Core courses must be completed with a grade of C or better.

(5) Directed electives may be major field courses or general education courses. They are chosen jointly by student and advisor to ensure that all graduation requirements are met. Non AAS degreed students must satisfy University and CMET general education requirements. AAS degreed students must satisfy CMET general education requirements.

(6) Core Elective may be Technical or Construction B&M. Technical Core Electives must be courses within the Department of Engineering Technology and approved by advisor (ETGR, ETCE, CMET, ETFS, ETEE, or ETME). Construction B&M Elective must be from following list: MKTG 3110, FINN 3120, or CMET 4127 or approved by the construction faculty advisor.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: May 25, 2006

RE: Request to clean up catalog copy for Fire Safety Engineering Technology

The request to clean up catalog copy for Fire Safety Engineering Technology was approved by the Chair of the Undergraduate Course & Curriculum Committee on May 15, 2006 for implementation Fall Semester, 2006.

Catalog Copy:

Freshman Year 1st Semester

ENGL 1101	English Composition	3
MATH 1100	College Algebra and Probability	3
ETGR 1201	Introduction to Engineering Technology	2
ETFS 1120	Fundamentals of Fire Protection	3
ETGR 1100	Engineering Tech. Computer Applications	3
ETFS 2126	Fire Investigation	3
		17

Freshman Year 2nd Semester

ENGL 1102	Writing in the Academic Community	3
CHEM 1111	Chemistry in Today's Society	3
STAT 1220	Elements of Statistics I	3
ETFS 1232	Fire Prot. Hydraulics & Water Supply	3

ETFS 1252 Fire Protection Law..... 3

15

Sophomore Year 1st Semester

PHYS 1101 Introductory Physics I..... 3

PHYS 1101L Introductory Physics I Lab..... 1

ETFS 2124 Fundamentals of Fire Prevention..... 3

ETFS 2132 Building Construction for Fire Protection..... 3

Social Science Course..... 3

Directed Elective..... 3

16

Sophomore Year 2nd Semester

PHYS 1102 Introductory Physics II..... 3

PHYS 1102L Introductory Physics II Lab..... 1

ETFS 2230 Hazardous Materials..... 3

ETFS 2264 Fire Behavior and Combustion..... 3

ETFS 2264L Fire Behavior and Combustion Lab..... 1

ETGR 1103 Technical Drawing I..... 2

Directed Elective for W Goal..... 3

16

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: May 15, 2006

RE: Request to clean up catalog copy for ECGR courses

The request to clean up catalog copy for ECGR courses was approved by the Chair of the Undergraduate Course & Curriculum Committee on May 10, 2006 for implementation Fall Semester, 2006.

Catalog Copy:

ECGR 2155. Logic and Networks Laboratory. (1) (W) Prerequisites: MATH 1242 (Calculus II). Co-requisites: ECGR 2111 (Network Theory I) ~~and ECGR 2181 (Logic Design I)~~ or permission of Department. Network measurements and applications, experimental logic design; introduction to laboratory equipment and techniques. *(Fall, Spring, Summer) (Evenings)*

ECGR 2156. Instrumentation and Networks Laboratory. (1) (W) Prerequisites: ECGR 2155 (Logic and Networks Lab). Co-requisites: ECGR 2112 (Network Theory II) **and ECGR 2181** or permission of Department. Network measurements, applications, and instrumentations. *(Fall, Spring, Summer) (Evenings)*

ECGR 2111. Network Theory I. (3) Prerequisites: MATH 1242 (Calculus II) and PHYS 2101 (Physics I). Co-requisites: PHYS 2102 (Physics II) **and** MATH 2171 (Differential Equations) ~~ECGR 2155 (Logic and Networks Lab)~~or permission of the Department. Introduction of Kirchoff's laws and terminal equations. Circuit analysis techniques and network theorems. Singularity functions and signals. Transient and natural response of first and second order networks. State variable analysis. *(Fall, Spring) (Evenings)*

ECGR 2181. Logic Systems Design I. (3) Prerequisites: MATH 1241 (Calculus I) or permission of the Department. ~~Co-requisite: ECGR 2155 (Logic and Networks Lab) or permission of the Department~~. Introduction to Boolean algebra; mixed logic; design of

combinational circuits; introduction to sequential systems; MSI building blocks; includes laboratory design projects. *(Fall, Spring)*

ECGR 2252. Electrical Engineering Design I. (2) (O) Prerequisites: ECGR 2111 and ECGR 2155 or equivalents. Co-requisites: ECGR 2112 and ECGR 2181 ~~and 2156~~ or equivalents. Introduction to the electrical engineering design process including teamwork, design specifications, conceptual design, detailed design, design integration, cost estimation and market considerations. Product design projects are completed and laboratory prototypes are developed and tested by design teams. Oral presentations and written technical reports on the design projects are required. *(Fall, Spring)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: May 15, 2006

RE: Request to edit catalog copy for CEGR courses

The request to edit catalog copy for CEGR courses was approved by the Chair of the Undergraduate Course & Curriculum Committee on May 10, 2006 for implementation Fall Semester, 2006.

Catalog Copy:

CEGR 2101. Civil Engineering Drawing. (2) Prerequisites: **None**. Introduction to engineering drawing in the environmental, geotechnical, transportation, and structural sub-disciplines of civil engineering, including sketching, principles of Mechanical drawing, and computer aided drawing (CAD). CAD utilizes the MOSAIC computing environment. One hour of lecture and three hours of laboratory per week. *(Fall)*

CEGR 3201. Systems and Design I. (3) Prerequisites: **CEGR 2154, Senior standing; three of the following and the rest in progress: CEGR 3122, 3151, 3143, 3161, 3278**. Systems engineering techniques applied to civil engineering problems emphasizing methodological considerations and engineering projects carried out by small groups of students. *(Fall)*

CEGR 3202. Systems and Design II. (3) Prerequisites: **CEGR 3201 in immediate previous semester.** Continuation of CEGR 3201. Creatively investigate the produce alternative solutions for a comprehensive engineering project resulting in written and verbal class presentations. One hour of lecture and three hours of laboratory per week. *(Spring)*

CEGR 3695. Civil Engineering Cooperative Education Seminar. (1) Required of co-op students following each work semester. Presentation of engineering reports on work done prior semester. *(Fall, Spring, Summer)*

CEGR 3143. Hydraulics and Hydrology. (3) Prerequisites**: MEGR 2141 and MATH 2171** and junior standing. Fluid properties, pressure, closed-conduit flow, pipe network, pumps, open channel flow, weirs, orifices, flumes; precipitation, runoff, groundwater flow, steam flow, flow measurement. *(Fall)*

CEGR 3258. Geotechnical Laboratory. (1) (W) Co-requisite: CEGR 3278. Test to determine engineering properties of soils; consistency, permeability, shear strength, and consolidation. Data analysis, presentation and report writing. One hour of lecture and three hours of laboratory per week. *(Spring)*

CEGR 3090. Special Topics in Civil Engineering. (1-4) Prerequisite: Consent of CE Advisor. Examination of specific new areas emerging in the various fields of civil engineering based upon and synthesizing knowledge students have gained from engineering science, mathematics, and physical science stems of the core curriculum. May be repeated for credit. *(On demand)*

CEGR 3212. Computer Applications in Civil Engineering. (3) Prerequisite: Three of the following: CEGR 3122, 3141, 3143, 3161, 3278. Application of computers and

numerical methods to various types of civil engineering problems. Examinations in depth of selected civil engineering problems. *(On demand)*

CEGR 4144. Engineering Hydrology. (3) **Prerequisite: CEGR 3143**. The quantitative study of the various components of the water cycle, including precipitation, runoff, ground water flow, evaporation and transpiration, steam flow. Hydrograph analysis, flood routing, frequency and duration, reservoir design, computer applications. *(On demand)*

CEGR 4145. Groundwater Resources Engineering. (3) **Prerequisite: CEGR 3143**. Overview of hydrological cycle principles of ground water flow and well hydraulics. Regional groundwater flow and flow nets. Water chemistry and contamination. Applications of groundwater modeling. *(Fall) (Alternate Years)*

CEGR 4108. Finite Element Analysis and Applications. (3) **Prerequisite: CEGR 3122 with a grade of C or better.** Finite element method and its application to engineering problems. Application of displacement method to plane stress, plane strain, plate bending and axisymmetrical bodies. Topics include but are not limited to dynamics, fluid mechanics, and structural mechanics. *(Spring)*

CEGR 4124. Masonry Design. (3) **Prerequisite: CEGR 3122 with a grade of C or better and CEGR 3225.** Introduction of masonry material and engineering and materials properties and testing procedures. Design of reinforced and unreinforced masonry (clay and concrete) walls, beams, and columns for vertical, winde, and seismic loads. Analysis and design of masonry structures (including torsion) and introduction to computer applications. *(On demand)*

CEGR 4222. Structural Steel Design II. (3) **Prerequisite: CEGR 3122 with a grade of C or better and CEGR 3221.** Analysis and design of structural steel components and systems with emphasis on theories necessary for a thorough understanding of the design of complete structures. Compression members affected by local buckling, continuous beams, and beam columns are covered. Welded and bolted connections. Current AISC Specifications used. *(Spring)*

CEGR 4224. Advanced Structural Analysis. (3) Prerequisite: CEGR 3122 with a grade of C or better. A continuation of CEGR 3122. Methods to determine deflections in structural members, including moment area, conjugate beam, virtual work, and matrix stiffness methods. Project to compare analysis techniques and introduce use of structural analysis computer programs. *(Spring)*

CEGR 4226. Reinforced Concrete Design II. (3) Prerequisite: CEGR 3211 with a grade of C or better and CEGR 3225. Analysis and design

Of reinforced concrete components and systems with emphasis on the fundamental theories necessary for a thorough understanding of concrete structures. Concentrically loaded slender columns, slender columns under compression plus bending. Wall footings and column footings. Analysis of continuous beams and frames. Total design project involving the analysis and design of a concrete structure. Current ACI Specifications used. *(Spring)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Secretary to Faculty Governance

DATE: March 27, 2006

RE: Request to make changes to the Electrical Engineering Curriculum

The request to make changes to the Electrical Engineering Curriculum was approved by the Chair of the Undergraduate Course and Curriculum Committee on March 17, 2006 for implementation Fall Semester, 2006.

Catalog Copy (Changes in blue):

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING (B.S.E.E.)

The curricula described are subject to change. Please consult with the Chair or the Associate Chair for the latest versions.

A major in Electrical Engineering leading to the B.S.E.E. degree consists of a total of 127 credit hours.

The **Program Educational Objectives** are as follows:

- To provide our students the opportunity and the environment to acquire the educational background necessary to pursue professional careers in Electrical Engineering and/or to continue their education toward an advanced degree in the field.
- To provide graduates who have a comprehensive background in mathematics, physical and social sciences, liberal arts, and human values, with in-depth knowledge of the fundamentals of engineering science and Electrical Engineering that perpetuates life-long learning.
- To provide graduates with the tools to pursue successful and long careers in the profession that places ethical conduct as paramount.
- To prepare graduates who can effectively communicate their thoughts and ideas to their surroundings along with the understanding of the impact of electrical engineering on global, societal, and environmental issues.
- To provide graduates who have state-of-the-art computer skills suitable for a modern career in electrical engineering, where computer utilization is an essential tool.

The laboratory courses are designed to: (1) teach the basic techniques of instrumentation; (2) develop skills in communications; and (3) relate the analytical methods developed in the classroom to the performance of real physical systems.

The degree requirements are:

English..... 6

Liberal Studies..... 12

Mathematics..... 15

Physics..... 10

Chemistry..... 4

Science or Math Elective..... 3

Engineering..... 5

Mechanical Engineering..... 3

Departmental Requirements..... 54

Technical Electives..... 12

Economics..... 3

Total..... 127

Note: one course in foreign language may be considered as HUM/SS

The *social science and humanities electives* must include some courses at an advanced level and be chosen to satisfy the University General Education requirements and to meet the objectives of a broad education consistent with the educational goals of the profession.

The *science elective* must be chosen from college-level physical or biological science courses. The *math elective* must be chosen from college-level, non-remedial mathematics or statistics courses. This elective course should complement the student's overall educational plan.

The *technical electives* are chosen by students in consultation with their academic advisor. Students can use these electives to: (1) obtain some breadth within electrical engineering by choosing additional advanced courses; (2) obtain significant depth within a particular area of electrical or computer engineering; and (3) prepare for graduate work in electrical or computer engineering. The technical elective must contain at least twelve hours of coursework dealing with engineering science, analysis, synthesis, or

design. See Department guidelines for selection of these courses. All junior-level core courses must be satisfactorily completed prior to enrolling in the senior project courses.

CURRICULUM PLAN: B.S.E.E. DEGREE

Freshman Year

ENGR 1201 – Intro to Engineering Practices & Principles I..... 2

CHEM 1251 - Principles of Chemistry..... 3

CHEM 1251L – Chemistry Lab..... 1

MATH 1241 – Calculus I..... 3

ENGL 1101 – English Composition..... 3

LBST 1101, 1102, 1103, 1104, or 1105..... 3

Total 15

ENGR 1202 – Intro to Engineering Practices & Principles II..... 2

MATH 1242 – Calculus II..... 3

PHYS 2101 – Physics for Science & Engineering I..... 3

PHYS 2101L – Physics Lab I..... 1

ENGL 1102 – Composition & Literature..... 3

LBST 2101 – Western Cultural & Historical Awareness..... 3

Total..... 15

Sophomore Year

ECGR 2103 – Computer Utilization in C++..... 3

ECGR 2111 – Network Theory I..... 3

ECGR 2155 – Lab: Logic & Networks..... 1

ECGR 2181 – Logic System Design I..... 3

MATH 2171 – Differential Equations..... 3

PHYS 2102 – Physics for Science & Engineering II..... 3

Total..... 16

ECGR 2112 – Network Theory II..... 3

ECGR 2156 – Lab: Instrumentation and Networks..... 1

ECGR 2252 – Electrical Engineering Design I..... 2

MATH 2241 – Calculus III..... 3

PHYS 3141 – Introduction to Modern Physics..... 3

LBST 2102 – Global & Intercultural Connections..... 3

Total..... 15

Junior Year

ECGR 3111 – Signals and Systems..... 3

ECGR 3121 – Introduction to Electromagnetic Fields..... 3

ECGR 3131 – Fund of Electronics & Semiconductors..... 3

ECGR 3155 – Lab: Systems and Electronics..... 1

ECGR 3157 – Electrical Engineering Design II..... 2

ENGR 3295 – Professional Development..... 1

LBST 2211, 2212, 2213, 2214, or 2215..... 3

Total..... 16

ECGR 3122 – Electromagnetic Waves..... 3

ECGR 3132 – Electronics..... 3

ECGR 3133 – Solid State Microelectronics I

or

ECGR 3142 – Electromagnetic Devices..... 3

ECGR 3156 – Lab: Electromagnetic & Electronic Devices..... 1

STAT 3128 – Probability and Statistics for Engineers..... 3

ECGR 3112 – System Analysis II

or

ECGR 3181 – Logic System Design II..... 3

Total..... 16

Senior Year

ECGR 3253 – Senior Design I..... 2

ECGR 4123 – Analog & Digital Communication

or

ECGR 4124 – Digital Signal Processing..... 3

ECGR Senior Elective..... 3

Technical Elective..... 3

Technical Elective..... 3

Science or Math Elective..... 3

Total..... 17

ECGR 3159 – Elec. Engineering Professional Practice..... 2

ECGR 3254 – Senior Design II..... 3

MEGR 3111 – Thermodynamics..... 3

ECON 2101 – Economics..... 3

Technical Elective..... 3

Technical Elective..... 3

Total..... 17

Total Hours: 127

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: March 10, 2006

RE: Request to establish ENGR 4090: Special Topics

The request to establish ENGR 4090: Special Topics was approved by the Chair of the Undergraduate Course and Curriculum Committee on March 9, 2006 for implementation Fall Semester, 2006.

Catalog Copy:

ENGR 4090. Special Topics. (1-4) Directed study of current topics of special interest. May be repeated for credit. *(On demand)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: March 3, 2006

RE: Request to establish ETFS 3400 (Practicum) and ETFS 3800 (Independent Study)

The request to establish ETFS 3400 (Practicum) and ETFS 3800 (Independent Study) was approved by the Chair of the Undergraduate Course and Curriculum Committee on March 1, 2006 for implementation Fall Semester, 2006.

Catalog Copy**:**

ETFS 3400. Practicum. (1-4) Prerequisite: Must be classified as a junior, have a cumulative 2.2 GPA and the approval of FSET program faculty. This course is designed to allow students to participate in an approved applied practicum designed to allow theoretical and course-based learning in a supervised fire and/or safety related environment. Each practicum experience is individual and is arranged with a contract between the supervising faculty member, the student and the employer. Students must complete the practicum proposal form and identify a faculty member who will direct and evaluate the completed work. Practicum requires a weekly progress report as well as a final report and presentation to be graded by the supervising faculty member. May be repeated for up to a total of 4 hours. *(On demand)*

ETFS 3800. Independent Study. (1-3) Prerequisite: Must be classified as a junior, have a cumulative 2.2 GPA and the approval of FSET program faculty. This course is designed to allow students to take responsibility for the direction of their learning about

a topic of interest to them. Each independent study is individual and is arranged with a contract between the supervising faculty member and the student. Students must complete the independent study proposal form and identify a faculty member who will direct and evaluate the completed work. Each hour of credit for this course should be comparable to what would be expected in the classroom – 15 hours contact time plus outside work or approximately 30 hours. The project is culminated with a final report and presentation. May be repeated for a total of 3 hours. *(On demand)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: March 3, 2006

RE: Request to add prerequisites to ETME 2102 and ETME 2156 and 2156L

The request to add prerequisites to ETME 2102 and ETME 2156 and 2156L was approved by the Chair of the Undergraduate Course and Curriculum Committee on March 1, 2006 for implementation Fall Semester, 2006.

Catalog Copy **(changes in blue):**

ETME 2102. Mechanisms. (3) **Prerequisites: ETGR 1103, ETGR 2102, PHYS 1101.** This course covers plane motion and devices used to generate plane motion. Topics include analysis of displacement, velocity, acceleration, gears, cams and other mechanical systems. *(Spring)*

ETME 2156. Machine Shop Practices. (2) and ETME 2156L. Machine Shop Practices Lab (1) **Prerequisites: ETME 1101, ETME 2101, ETGR 1103.** This course introduces students to machine shop techniques and designing for machining with a combination of lectures and projects. Students will learn design for machining guidelines, about specification of machining operations, and about shop measurement instruments and techniques. *(Spring)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: March 3, 2006

RE: Request to change name, update course description, and add prerequisites to ETME 2202

The request to change name, update course description, and add prerequisites to ETME 2202 was approved by the Chair of the Undergraduate Course and Curriculum Committee on March1, 2006 for implementation Fall Semester, 2006.

Catalog Copy **(changes in blue):**

ETME 2202. ~~**Mechanical Drawing**~~ **Introduction to Mechanical Design. (2) Prerequisites: ETGR 1104, ETGR 1202. This course introduces mechanical design techniques using computer based parametric modeling tools such as Autodesk Inventor. Topics include feature based solid modeling, design constraints, assemblies, mechanisms, animations, and design documentation via technical drawings. Proficiency is demonstrated by an end-of-term design project**. *(Fall)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: March 3, 2006

RE: Request to change name, update course description, and add prerequisites to ETGR 3233

The request to change name, update course description, and add prerequisites to ETGR 3233 was approved by the Chair of the Undergraduate Course and Curriculum Committee on March1, 2006 for implementation Fall Semester, 2006.

Catalog Copy **(changes in blue):**

ETGR 3233. ~~**Computer Graphic Technology**~~ **Parametric Solid Modeling. (3) Prerequisite: ETGR 1104. Study of parametric solid modeling as a design/drawing tool using software such as Pro|Engineer. Topics include creation of three-dimensional solid models, assemblies, and renderings, as well as generation of two-dimensional technical drawings from three-dimensional models**. *(On demand)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: March 3, 2006

RE: Request to update course description, and add prerequisites to ETGR 1104

The request to update course description, and add prerequisites to ETGR 1104 was approved by the Chair of the Undergraduate Course and Curriculum Committee on March1, 2006 for implementation Fall Semester, 2006.

Catalog Copy **(changes in blue):**

ETGR 1104. Technical Drawing II. (2) Prerequisite: ETGR 1103. This course is a continuation of ETGR 1103, and introduces the student to advanced techniques of

Computer Aided Drawing (CAD). **Topics include three-dimensional wireframe, surface, and solid models, as well as rendering and generation of two-dimensional technical drawings from three-dimensional models**. Upon completion of the course, students should be able to **create, modify, and render three-dimensional models** using modern computer aided drawing tools such as AutoCAD. **One** hour of lecture and three hours of laboratory per week. *(Spring)*

MEMORANDUM

TO: Dean Nancy Gutierrez, College of Arts and Sciences

Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: December 9, 2005

RE: Request to establish a dual degree program between the Department of Physics & Optical Science and the Department of Mechanical Engineering.

The request to establish a dual degree program between the Department of Physics & Optical Science and the Department of Mechanical Engineering was approved by the chair of the Undergraduate Course and Curriculum Committee on November 8, 2005 for implementation Spring Semester 2006.

Catalog Copy

DUAL DEGREE PROGRAM WITH MECHANICAL ENGINEERING

The Department of Physics and Optical Science offers a dual degree opportunity with the Department of Mechanical Engineering. The dual degree is designed to broaden and enhance the education of students in the engineering degree program. Students can obtain a B.S. Physics and B.S. Mechanical Engineering dual degree.

B.S.M.E. /B.S. Physics

To obtain a dual B.S. degree in Mechanical Engineering and Physics, an undergraduate student must complete all requirements for the B.S.M.E. degree as established by the Department of Mechanical Engineering. In addition, the student must complete 12 hours of upper division physics courses specified by the Department of Physics and Optical Science. To meet the upper division physics requirement,

students must complete the following courses: PHYS 3141 (Introduction to Modem Physics), PHYS 4231 (Electromagnetic Theory I), PHYS 4241 (Quantum Mechanics I), and 3 elective hours chosen from a list of approved courses available from the Department of Physics and Optical Science. A B.S. in Physics under this program will be awarded at the same time as the B.S.M.E. The B.S. Physics degree will not be awarded in advance of the engineering degree.

Current B.S. Physics requirements:

PHYS 1000 -New Student Seminar

PHYS 2101, 2101L, 2102, and 2102L -Introductory Physics

PHYS 3101 -Topics and Methods of General Physics

PHYS 3121 -Classical Mechanics

PHYS 3141 -Introduction to Modem Physics

PHYS 3151 -Thermal Physics

PHYS 3282 and PHYS 3283 -Advanced Labs

PHYS 4231 and PHYS 4232 -Electromagnetic Theory

PHYS 4241 -Quantum Mechanics

9 elective hours of PHYS at 3000-4000 level

CHEM 1251 and 1251L

ITCS 1214

MATH 1241, MATH 1242, MATH 2171, MATH 2241, MATH 2242

B.S. Physics / B.S.M.E.

Common courses: These courses are taken as part of both the B.S. M.E. and B.S. Physics.

PHYS 2101 and 2101L, PHYS 2102 and 2102L, CHEM 1251 and 1251L, MATH 1241, MATH 1242, MATH 2171, MATH 2241.

*Note: Students in this program will be encouraged to take MATH 2242 as their Math elective in the ME curriculum.

Substitutions: Students in this dual degree program will be allowed to substitute certain engineering courses for the physics requirements.

ENGR 1201 (Intro. To Engineering Practice and Principles) for PHYS 1000

MEGR 2240 (Computational Methods) for PHYS 3101

MEGR 3111 (Thermodynamics I) for PHYS 3151

MEGR 3121 (Dynamic Systems I) for PHYS 3121

MEGR 3122 (Dynamic Systems II) for PHYS 3122

ECGR 2161 (Basic Electronic Engineering) for 3 hrs PHYS elective credit

MEGR 3255/3256 (Senior Design I and II) for PHYS 3282/3283

MEGR 3171 (Measurements and Instrumentation) for ITCS 1214

Additional courses required for the dual degree

PHYS 3141 (Introduction to Modem Physics), PHYS 4231 (Electromagnetic Theory I), PHYS 4241 (Quantum Mechanics I), 3 elective hours at 3000-4000 level.

MEMORANDUM

TO: Dean Nancy Gutierrez, College of Arts and Sciences
Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: October 29, 2005

RE: Request to Revise the Degree and Candidacy Requirements for the Ph.D. in Optical Science and Engineering

The request to Revise the Degree and Candidacy Requirements for the Ph.D. in Optical Science and Engineering was approved by the Graduate Council on October 17, 2005 and by the Faculty Council on the October 18, 2005 Consent Calendar for implementation Spring Semester, 2006.

Catalog Copy:

The Interdisciplinary Program in Optical Science and Engineering proposes revisions and clarifications in the Ph.D. curriculum regarding the following:

- Degree requirements - increasing the minimum credit hours of dissertation research, decreasing the course requirements for OPTI prefix courses while maintaining the 72 credit hour degree requirement, and increasing the minimum OPTI seminar credit requirement. The list of "approved" interdisciplinary courses, that could be substituted for OPTI courses, has been eliminated.
- Qualifying examination - adding a written and oral Qualifying Examination to be administered by the Optics Faculty after a student completes their Core Curriculum.
- Admission to candidacy requirements – in addition to current requirements (completion of the Core Curriculum, presentation of the Plan of Study, and successful approval of the Research Plan), students admitted to candidacy must successfully

- complete the Qualifying Exam and have a minimum 3.4 GPA in all courses in the Core Curriculum.
- Course title and content - proposes minor revisions in one of the Core Curriculum courses(OPTI 6105/8105) including the course name and some of the content. The M.S. in Optical Science and Engineering is unchanged.

Department of Physics and Optical Science

101 Burson Building

704-687- 2537

http://www.physics.uncc.edu

Degrees

Ph.D. (Optical Science and Engineering)

M.S. (Optical Science and Engineering)

Coordinator

Dr. Robert K. Tyson

135-E Burson Building

704-687-3399

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Graduate Faculty

Department of Physics and Optical Science

Vasily Astratov - Assistant Professor

Angela D. Davies - Assistant Professor

Faramarz Farahi - Professor

Michael A. Fiddy – Professor

Greg J. Gbur – Assistant Professor

Tsing-Hua Her - Assistant Professor

Terrill W. Mayes - Emeritus Professor

Patrick J. Moyer - Associate Professor

Jeff Naeini - Assistant Professor

M. Yasin Akhtar Raja - Professor

Tom Suleski - - Assistant Professor

Robert K. Tyson -Associate Professor

Department of Electrical and Computer Engineering

Stephen M. Bobbio – Professor

Lee W. Casperson - Professor

James M. Conrad – Associate Professor

Kasra Daneshvar - Professor

Mohamad A. Hasan - Associate Professor

Raphael Tsu - Professor

Edward B. Stokes - Associate Professor

Department of Chemistry

Bernadette T. Donovan-Merkert - Professor

Thomas D. DuBois – Professor

Kenneth E. Gonsalves – Professor

Mahnaz El-Kouedi – Assistant Professor

Daniel S. Jones – Associate Professor

Joanna K. Krueger – Assistant Professor

Jordan C. Poler - Associate Professor

Thomas A. Schmedake - Assistant Professor

Wade N. Sisk - Associate Professor

Department of Mathematics

Wei Cai – Professor

Yuri Godin – Assistant Professor

Michael V. Klibanov - Professor

Thomas R. Lucas – Professor

Stanislav Molchanov - Professor

Boris Vainberg - Professor

Department of Mechanical Engineering

Robert J. Hocken - Professor

Stuart T. Smith - Professor

Department of Computer Science

Teresa A. Dahlberg - Associate Professor

M. Taghi Mostafavi - Associate Professor

Kayvan Najarian – Assistant Professor

Department of Engineering Technology

Falih H. Ahmad - Associate Professor

Programs of Study

The M.S. and Ph.D. programs in Optical Science and Engineering are interdisciplinary involving six science and engineering departments and two Centers [Physics & Optical Science, Chemistry, Mathematics, Electrical & Computer Engineering, Mechanical Engineering & Engineering Science, and Computer Science, the Center for Optoelectronics & Optical Communications, and the Center for Precision Metrology.] The program is administered through the Department of Physics & Optical Science. The purpose of the program is to educate scientists and engineers who will develop the next generation of optical technology. The program emphasizes basic and applied interdisciplinary education and research in areas of optics that include:

- Optoelectronic devices and sub-assemblies
- Devices for telecommunications, sensors, and characterization
- Optical materials (semiconductors, polymer-organic and crystalline)
- Optical metrology
- Optical imaging
- Optical communication networks

Applications of this research include:

- Optical telecom and data-com
- High efficiency, tunable narrow bandwidth laser sources and detectors
- Smart structures for distributed sensing
- Wireless technologies for communications and remote sensing
- Materials and surface characterization
- Nanostructured optical devices
- Microelectronics

- Biosensing and medical imaging

A complete description of the research activity within the Optical Science and Engineering program can be accessed at the web address http://optics.uncc.edu .

Documents to Be Submitted for Admission

a. Official transcripts from all colleges and universities attended.

b. Official GRE scores.

c. Official TOEFL scores (if the previous degree was from a country where English is not the official language).

d. The UNC Charlotte application for graduate admission form.

e. A minimum of three letters of reference.

f. An essay detailing the applicant's motivation and career goals.

M.S. in Optical Science and Engineering

Additional Admission Requirements

In addition to fulfilling the university's general requirements for graduate admission at the Master's level, all applicants seeking admission into the Optics M.S. program must fulfill the university's general requirements for graduate admission at the M.S. level. Additional requirements for admission into the program are:

a. A baccalaureate or masters degree in Physics, Chemistry, Mathematics, Engineering, Optics, Computer Science, or a related field with a minimum undergraduate GPA of 3.0 overall and 3.0 (A = 4.0) in the major.

b. A minimal combined score of 1000 on the verbal and quantitative portions of the GRE, and satisfactory scores on the analytical and discipline specialty sections of the GRE.

c. A minimum score of 220 (computer-based test) or 557 (paper-based test) or 83 (Internet-based test)) on the TOEFL if the previous degree was from a country where English is not the official language.

d. Positive letters of recommendation.

e. Students may be required to take undergraduate courses determined by the Optics Program Committee on an individual basis. Such courses will be specified at the time of admission into the program.

Degree Requirements

The degree of Master of Science in Optical Science and Engineering is awarded for completion of scholarly research that advances the knowledge base in the field of that research. Evidence of this is demonstrated by a successful thesis defense. Additionally, recipients of this degree should demonstrate mastery of relevant subject matter and a potential for success, usually in a position with government or industry.

The minimum requirement for the M.S. degree in Optical Science and Engineering is 32 credit hours beyond the baccalaureate degree.

Each candidate for the M.S. degree in Optical Science and Engineering must

- *Present evidence of competency in the Core Curriculum,*
- *Complete 2 semesters (2 credit hours) of Seminar (OPTI 6110),*
- *Complete a minimum of 21 credit hours (7 courses) in formal courses which may include the Core Curriculum,*
- *Complete a minimum of 9 credit hours of thesis research(OPTI6991),*
- *Present a Plan of Study detailing all course and examination requirements,*
- *Present a M.S. Research Plan,*

- *Successfully defend the M.S. thesis.*

Admission to Candidacy

Students are admitted to candidacy upon completion of the Core Curriculum, appointment of a M.S. advisor, formation of an Advisory Committee, presentation of the Plan of Study, and approval of the Research Plan. These steps to candidacy must be completed within two years following admission to the program.

Core Curriculum

All graduates of the program must demonstrate competency in the Core Curriculum. Students may do so by completing the 5 Core Courses with a grade of B or better in each course. Well-prepared students may demonstrate competency in the Core Curriculum by earning a grade of pass on one or more of the five sections of a Core examination. In those cases, credit hours that would have been earned in the courses may be replaced by credit hours in OPTI 6991, Thesis Research, and/or other electives approved by the student's Advisory Committee and the Optics Program Director.

Thesis Advisor and Advisory Committee

Each student in the program must have a Thesis Advisor and an Advisory Committee before being admitted to candidacy. The student should select a thesis advisor before the end of the third semester of residency. The student and the thesis advisor jointly determine the advisory committee. The Thesis Advisor serves as Chair of the Advisory Committee and must be a member of the Optics Faculty at UNC Charlotte. The advisory committee must have at least 3 members, the majority of which must be members of the Optics Faculty. Composition of the Advisory Committee must be approved by the Optics Program Director.

Plan of Study

All students must prepare a Plan of Study before the end of the third semester following admission to the program. The Plan of Study should show in detail how the student will meet the 32 credit hour minimum. The Plan of Study must be approved by the Advisory Committee.

Research Plan

After successful completion of the Core Curriculum requirement and approval of the Plan of Study, the student will prepare a written Research Plan and an oral defense of that Plan presented in a public seminar. The Research Plan must be approved by the Advisory Committee. The Research Plan must demonstrate: (a) the student's knowledge of the relevant literature base, and (b) a research plan that, if successfully completed, will lead to an approved thesis.

Thesis

Each student will complete a minimum of 9 credit hours of thesis research. The student must present a written thesis to the Advisory Committee. The student must defend the thesis at a presentation before the Optics Faculty. Upon approval of the written thesis and oral presentation by the Advisory Committee, the student has successfully completed the thesis requirement. The thesis must be written using a format acceptable to the Graduate School.

Residency Requirement

The student must satisfy the residence requirement for the program by completing 12 credit hours of continuous enrollment in coursework/dissertation credit. Residence is considered continuous if the student is enrolled in one or more courses in successive semesters until 12 credit hours are earned.

Time Limit for Completion of Program Requirements

All program requirements must be completed within 6 calendar years from the date the student is admitted into the program.

Transfer Credit Accepted

Up to 6 credit hours of approved coursework may be transferred from other accredited masters and doctoral programs. Only courses in which the student earned a grade of B

or better (or its equivalent) can be transferred. No more than 6 credit hours of approved coursework taken as a post-baccalaureate student may be applied toward the degree. Credit for thesis research cannot be transferred.

Assistantships

Support for beginning graduate students is usually a teaching assistantship. Continuing students are often supported by research assistantships.

Comprehensive Examination

The thesis defense is the final examination.

Language Requirement

The program has no language requirement.

Ph.D. in Optical Science and Engineering

Additional Admission Requirements

All applicants seeking admission into the Optical Science and Engineering Ph.D. program must fulfill the university's general requirements for graduate admission at the Ph.D. level. Additional requirements for admission into the program are

a. A baccalaureate or masters degree in Physics, Chemistry, Mathematics, Engineering, Optics, Computer Science, or a related field with a minimum undergraduate GPA of 3.0 overall and 3.2 (A = 4.0) in the major. In the case a candidate presents a masters degree at application, a minimum graduate GPA of 3.2 (A = 4.0) on all graduate work is required.

b. A minimal combined score of 1100 on the verbal and quantitative portions of the GRE and satisfactory scores on the analytical and discipline specialty sections of the GRE.

c. A minimum score of 220 (computer-based test) or 557 (paper-based test) or 83 (Internet-based test)) on the TOEFL if the previous degree was from a country where English is not the official language.

d. Positive letters of recommendation.

e. Students may be required to take undergraduate courses determined by the Optics Program Committee on an individual basis. Such courses will be specified at the time of admission into the program.

Degree Requirements

The degree of Doctor of Philosophy in Optical Science and Engineering is awarded for completion of scholarly research that advances the knowledge base in the field of that research. Evidence of this is demonstrated by a successful dissertation defense. Additionally, recipients of this degree should demonstrate mastery of relevant subject matter and a potential for success in future research and teaching.

The minimum requirement for the Ph.D. degree in Optical Science and Engineering is 72 credit hours beyond the baccalaureate degree.

Each candidate for the Ph.D. degree in Optical Science and Engineering must

- *Present evidence of competency in the Core Curriculum,*
- *Complete 2 semesters (2 credit hours)of Seminar (OPTI 8110)during the first 2 semesters of residency and complete 1 semester (1 credit hour) of Seminar (OPTI 8110) during each academic year of residency in the program,*
- *Complete a minimum of 9 credit hours (3 courses) in formal courses having an OPTI prefix in addition to the Core Curriculum,*
- *Complete a minimum of 24 credit hours of dissertation research(OPTI8991),*

- *Present a Plan of Study detailing all course and examination requirements,*
- *Successfully complete the written and oral qualifying exam,*
- *Present a Ph.D. Research Plan,*
- *Successfully defend the Ph.D. dissertation.*

The remaining credit hours must be approved on a case-by-case basis by the student's Advisory Committee and the Optics Program Director.

A student in the Ph.D. program must maintain a minimum GPA of 3.0 in all coursework attempted for the degree. An accumulation of two C grades will result in termination of the student's enrollment in the program. A grade of U earned in any course will result in termination of the student's enrollment in the program.

Admission to Candidacy

Students are admitted to candidacy upon completion of the Core Curriculum with a GPA of 3.4 or better, appointment of a Ph.D. advisor, formation of an Advisory Committee, presentation of the Plan of Study, successful completion of the Qualifying Exam, and approval of the Research Plan. These steps to candidacy must be completed within two years following admission to the program.

Core Curriculum

All graduates of the program must demonstrate competency in the Core Curriculum. Students may do so by completing the 5 Core Courses with a grade of B or better in each course and a GPA of 3.4 or better in those courses. Failure to demonstrate competency in this manner will result in termination from the program. Well-prepared students may demonstrate competency in the Core Curriculum by earning a grade of pass on one or more of the five sections of a Core examination. In those cases, credit hours that would have been earned in the courses may be replaced by credit hours in OPTI 8991, Dissertation Research, and/or other electives approved by the student's Advisory Committee and the Optics Program Director.

Dissertation Advisor and Advisory Committee

Each student in the program must have a Dissertation Advisor and an Advisory Committee before being admitted to candidacy. The student should select a dissertation advisor before the end of the second year of residency. The student and the dissertation advisor jointly determine the advisory committee. The Dissertation Advisor serves as Chair of the Advisory Committee and must be a member of the Optics Faculty at UNC Charlotte. The advisory committee must have at least 4 members, the majority of which must be members of the Optics Faculty. Composition of the Advisory Committee must be approved by the Optics Program Director.

Plan of Study

All students must prepare a Plan of Study before the end of the third semester following admission to the program. The Plan of Study should show in detail how the student will meet the 72 credit hour minimum. The Plan of Study must be approved by the Advisory Committee.

Qualifying Exam

After successful completion of the Core Curriculum, students will have one opportunity to pass a written and oral qualifying examination administered by the Optics Faculty. Failure to pass the qualifying examination will result in termination from the program.

Research Plan

After successful completion of the Core Curriculum requirement and approval of the Plan of Study, the student will prepare a written Research Plan and an oral defense of that Plan presented in a public seminar. The Research Plan must be approved by the Advisory Committee. The Research Plan must demonstrate: (a) the student's knowledge of the relevant literature base, and (b) a research plan that, if successfully completed, will lead to an approved dissertation. The Research Plan is typically prepared during 1 semester (1 credit hour) of Research Seminar (OPTI8691).

Dissertation

Each student will complete a minimum of 24 credit hours of dissertation research. The student must present a written dissertation to the Advisory Committee. The student must defend the dissertation at a presentation before the Optics Faculty. Upon approval of the written dissertation and oral presentation by the Advisory Committee, the student has successfully completed the dissertation requirement. The dissertation must be written using a format acceptable to the Graduate School.

Residency Requirement

The student must satisfy the residence requirement for the program by completing 20 credit hours of continuous enrollment in coursework/dissertation credit. Residence is considered continuous if the student is enrolled in one or more courses in successive semesters until 20 credit hours are earned.

Time Limit for Completion of Program Requirements

All program requirements must be completed within 8 calendar years from the date the student is admitted into the program.

Transfer Credit Accepted

Up to 30 credit hours of approved coursework may be transferred from other accredited masters and doctoral programs. Only courses in which the student earned a grade of B or better (or its equivalent) can be transferred. No more than 6 credit hours of approved coursework taken as a post-baccalaureate student may be applied toward the degree. Credit for dissertation research cannot be transferred.

Assistantships

Support for beginning graduate students is usually a teaching assistantship. Continuing students are often supported by research assistantships.

Comprehensive Examination

The dissertation defense is the final examination.

Language Requirement

The program has no language requirement.

Core Curriculum

A student in either the M.S. or Ph.D. program should plan to complete the core curriculum, shown below, during the first year of residence. Courses taken after completion of the core curriculum are elective, but must be approved by the student's Advisor and Advisory Committee. Courses in the core curriculum are prerequisites to elective OPTI courses. Students in the M.S. program are to enroll in courses having a 6XXX number. Students in the Ph.D. program are to enroll in courses having an 8XXX number.

Fall

OPTI 6101/8101 and	Mathematical Methods of Optical Science Engineering
OPTI 6102/8102	Principles of Geometrical and Physical Optics
OPTI 6105/8105	Fundamentals of Light/Matter Interactions
OPTI 6110/8110	Seminar

Spring

OPTI 6104/8104	Electromagnetic Waves
OPTI 6211/8211	Introduction to Modern Optics
OPTI 6110/8110	Seminar

Courses in Optical Science and Engineering (OPTI)

M.S. Degree

CORE CURRICULUM

OPTI 6101. Mathematical Methods of Optical Science and Engineering. (3). Topics include: matrix theory, series and Frobenius methods of solutions to ordinary differential equations, separation of variables techniques for partial differential equations, special functions, Fourier series, and transform methods. Topical coverage will emphasize applications specific to the field of optics. Three lecture hours per week. (Fall)

OPTI 6102. Principles of Geometrical and Physical Optics. (3) Ray analysis of common optical elements (mirrors, lenses and systems of lenses, prisms). Reflection and refraction at plane and spherical surfaces, thin and thick lenses, lensmaker's equation, field of view, and numerical aperture. Wave properties of light, superposition of waves, diffraction, interference, polarization, and coherence. Optics of thin films. Three lecture hours per week. (Fall)

OPTI 6104. Electromagnetic Waves. (3) Program. Maxwell's equations, the electromagnetic wave equation, and electromagnetic wave functions. Waves in dielectric and conducting media, dispersion. Reflection, refraction, transmission, internal reflection, and evanescent waves at an interface. Intensity. Introduction to guided waves. Three lecture hours per week. (Spring)

OPTI 6105. Fundamentals of Light/Matter Interactions. (3) Quantized nature of light and matter; particle in a box; electronic structure of atoms, molecules, solids; transition rates, oscillator model of light-matter interactions; and examples of different material classes. Three lecture hours per week. (Fall)

OPTI 6211. **Introduction to Modern Optics. (3)** Prerequisites: OPTI 6102 or permission of the instructor. Fourier analysis and holography, Coherence. Introduction

to light production and detection. Optical modulation, including EO effect, Kerr effect, amplitude modulation, magnetooptic effect, photoelastic effect, and acousto-optic effect. Introduction to nonlinear optics. Photonic switching. Three lecture hours per week. (Spring)

OPTI 6110. Seminar. (1) Prerequisite: Admission to Optics M.S. program. Topics include: discussion and analysis of topics of current interest in optics; effective techniques for making presentations and utilizing library materials; ethical issues in science and engineering. Attendance required. May be repeated for up to 4 hours credit. One semester of seminar is required of all students in the Optics M.S. program during each of their first two semesters of residence. After the first two semesters, students are required to attend a minimum number of designated lectures. One to two hours per week. Graded Pass/Fail. (Fall/Spring)

THESIS RESEARCH

OPTI 6991. Thesis Research. (1 – 3) Prerequisite: Admission to candidacy. Research for the thesis. May be repeated for a total of 18 credit hours. Graded Pass/Fail. (Fall/Spring/Summer)

OPTI 7999. Masters Residence. (1) Prerequisite: OPTI 6991. Required of all Optics M.S. students who have completed all requirements for the degree except the thesis defense and are taking no other courses. May be repeated for credit. Credit for this course does not count toward the degree. Graded Pass/Fail. (Fall/Spring/Summer)

M.S. OPTICS ELECTIVES

OPTI 6000. Selected Topics in Optics. (3). Prerequisite: Consent of Optics Program Director. Selected topics in optics from areas such as medical optics, adaptive optics, all optical networks, etc. May be repeated for up to 6 hours of credit with consent of the Optics Program Director. (Fall/Spring/Summer)

OPTI 6103. **Light Sources and Detectors. (3)** Prerequisite: OPTI 6211. The nature of light, blackbody radiation. Optical sources, including discharge lamps, light-emitting

diodes, gas and solid state lasers. Quantum wells. Continuous wave and pulsed (mode-locked, Q-switched) lasers. Selected solid-state laser systems. Light detection, including thermal and quantum detectors, photomultiplier tubes, diode detectors. Noise in light sources and detectors. Three lecture hours per week. (Fall, Odd Years)

OPTI 6201. Fourier Optics and Holography. (3) Prerequisite: OPTI 6102 and OPTI 6104. Principles of scalar, Fresnel, and Fraunhofer diffraction theory. Coherent optical data processing. Optical filtering and data processing. Holography. Three lecture hours per week. (Fall, Even Years)

OPTI 6205. Advanced Optical Materials. (3) Prerequisites: OPTI 6104 and OPTI 6105 or ECGR 6133/8133. Molecular optical materials including fabrication methods. Luminescence centers; quenching. Nonlinear optics, including higher order terms of the susceptibility tensor. Photonic crystals. Three lecture hours per week. (Fall, Odd Years)

OPTI 6212. Integrated Photonics. (3) Prerequisites: OPTI 6102 and OPTI 6104. Theory and application of optical waveguides, free-space micro-optics, and integrated photonic devices. Fabrication and integration techniques, including motivations for choice of approach (hybrid vs. monolithic, materials, size, performance, etc). Modeling and simulation. Students will be required to work with mathematical packages such as Matlab and/or Mathematica to illustrate key concepts and to implement beam propagation/optical modeling simulations. Three lecture hours per week. (Spring, Odd Years)

OPTI 6221. **Optical Communications. (3)** Prerequisite: OPTI 6102 and OPTI 6103. Introduction to optical communications and basic communication block such as lasers, optical modulators, and optical transceivers. Review of fibers (attenuation, dispersions, etc.). Optical amplifiers. Passive and active photonic components such as tunable lasers and filters. Coherent and incoherent detection. Signal processing, photonic switching, and point-to-point links / connections. Three lecture hours per week. (Spring, Even Years)

OPTI 6222. **Optical Communication Networks. (3)** Prerequisite: OPTI 6221 or graduate standing in ECE, CS, or IT. Optical signal coding, multiplexing and de-multiplexing. Time-domain medium access (TDM (SONET) and TDMA), wavelength-division multiplexing (WDM and WDMA). Optical networks, add-drop multiplexing

(OADM), switching and routing technologies, Dispersion management. Optical clock and timing recovery. Optical amplification, wavelength conversion, transport, and networking protocols. Broadband ISDN concepts. Access, metro, and long-haul network topologies. Three lecture hours per week. (Fall, Even Years)

OPTI 6241. Optical System Function and Design. (3) Prerequisite: OPTI 6102. Advanced study of telescopes, microscopes, cameras, off-axis imaging systems, stops, apertures, multiple lenses, use and selection of ray trace computer codes. Three lecture hours per week. (Spring, Even Years)

OPTI 6242. Optical Propagation in Inhomogeneous Media. **(3)** Prerequisite: OPTI 6102 and OPTI 6104. Advanced study of free space propagation, scattering, and scintillation of Gaussian and uniform beam waves. Random processes, weak fluctuation theory, propagation through complex paraxial optical systems (Spring, Odd Years)

OPTI 6244. High Speed Photonics and Optical Instrumentation. (3) Prerequisite: OPTI 6103 and OPTI 6104. Study of instrumentation used for generation, detection, and manipulation of light in optical circuits. Topics include ultrashort pulse generation, photon-phonon interactions, 2^{nd} & 3^{rd} harmonic generation, squeezed light, optical tweezers, OPO, electro-optic modulators, selective polarizers, optical switches, amplifiers, multiplexing and mixing schemes, and application of CCD and CMOS cameras and detectors. Three lecture hours per week. (Spring, Odd Years)

OPTI 6261. Modern Coherence Theory. **(3)** Prerequisite: OPTI 6102 and OPTI 6104. Stochastic processes. Second order coherence of scalar and vector wavefields, radiation and states of coherence. Quantum wavefields. (Fall, Odd Years)

OPTI 6271. Advanced Physical Optics (3) Prerequisite: OPTI 6101, OPTI 6102, and OPTI 6104. Advanced study of electromagnetic wave propagation, stratified media, physics of geometrical optics, polarization and crystal optics, absorption and dispersion, interference, propagation and diffraction. Three lecture hours per week. (Spring, Odd Years)

OPTI 6281. Modern Optics Laboratory. (3) Prerequisite: OPTI 6102. Selected experiments in areas of modern optics such as fiber optics, interferometry, spectroscopy, polarization, optical metrology, and holography. Six laboratory hours per week. (Spring, Even Years)

OPTI 6691. Research Seminar. (1 - 3) Prerequisite**:** Consent of the Optics Program Director. A seminar in which independent study may be pursued by the student, or a group of students, under the direction of a professor. May be repeated for up to a maximum of 6 credit hours. (Fall/Spring/Summer)

Ph.D. Degree

CORE CURRICULUM

OPTI 8101. Mathematical Methods of Optical Science and Engineering. (3) See OPTI 6101 for Course Description.

OPTI 8102. Principles of Geometrical and Physical Optics. (3) See OPTI 6102 for Course Description.

OPTI 8104. Electromagnetic Waves. (3) See OPTI 6104 for Course Description.

OPTI 8105. Fundamentals of Light/Matter Interactions. (3) See OPTI 6105 for Course Description.

OPTI 8211. **Introduction to Modern Optics. (3)** Prerequisites: OPTI 8102 or permission of the instructor. See OPTI 6211 for Course Description.

OPTI 8110. Seminar. (1) Prerequisite: Admission to Optics Ph.D. program. Topics include: discussion and analysis of topics of current interest in optics; effective

techniques for making presentations and utilizing library materials; ethical issues in science and engineering. Attendance required. May be repeated for up to 6 hours credit. One semester of seminar is required of all students in the Optics Ph.D. program during each of their first two semesters of residence. After the first two semesters, students are required to attend a minimum number of designated lectures. One to two hours per week. Graded Pass/Fail. (Fall/Spring)

PH.D. DISSERTATION

OPTI 8991. Dissertation Research. (1 – 3) Prerequisite: Admission to candidacy. Research for the dissertation. May be repeated for a total of 45 credit hours. Graded Pass/Fail. (Fall/Spring/Summer)

OPTI 9999. Doctoral Residence. (1) Prerequisite: OPTI 8991. Required of all Optics Ph.D. students who have completed all requirements for the degree except the dissertation defense and are taking no other courses. May be repeated for credit. Credit for this course does not count toward the degree. Graded Pass/Fail. (Fall/Spring/Summer)

PH.D. OPTICS ELECTIVES

OPTI 8000. Selected Topics in Optics. (3) Prerequisite: Consent of Optics Program Director. See OPTI 6000 for Course Description.

OPTI 8103. **Light Sources and Detectors. (3)** Prerequisite: OPTI 8211. See OPTI 6103 for Course Description.

OPTI 8201. Fourier Optics and Holography. (3) Prerequisite: OPTI 8102 and OPTI 8104. See OPTI 6201 for Course Description.

OPTI 8205. Advanced Optical Materials. (3) Prerequisites: OPTI 8104 and OPTI 8105 or ECGR 6133/8133. See OPTI 6205 for Course Description.

OPTI 8212. Integrated Photonics. (3) Prerequisites: OPTI 8102 and OPTI 8104. See OPTI 6212 for Course Description.

OPTI 8221. **Optical Communications. (3)** Prerequisite: OPTI 8102 and OPTI 8103. See OPTI 6221 for Course Description.

OPTI 8222. **Optical Communication Networks. (3)** Prerequisite: OPTI 8221. See OPTI 6222 for Course Description.

OPTI 8241. Optical System Function and Design. (3) Prerequisite: OPTI 8102. See OPTI 6241 for Course Description.

OPTI 8242. Optical Propagation in Inhomogeneous Media. **(3)** Prerequisite: OPTI 8102 and OPTI 8104. See OPTI 6242 for Course Description.

OPTI 8244. High Speed Photonics and Optical Instrumentation. (3) Prerequisite: OPTI 8103 and OPTI 8104. See OPTI 6244 for Course Description.

OPTI 8261. Modern Coherence Theory. **(3)** Prerequisite: OPTI 8102 and OPTI 8104. See OPTI 6261 for Course Description.

OPTI 8271. Advanced Physical Optics (3) Prerequisite: OPTI 8101, OPTI 8102, and OPTI 8104. See OPTI 6271 for Course Description.

OPTI 8281. Modern Optics Laboratory. (3) Prerequisite: OPTI 8102. See OPTI 6281 for Course Description.

OPTI 8691. Research Seminar. (1 - 3) Prerequisite**:** Consent of Optics Program Director. See OPTI 6691 for Course Description.

optical science and engineering

Department of Physics and Optical Science

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http://www.physics.uncc.edu

Degrees

Ph.D. (Optical Science and Engineering)

M.S. (Optical Science and Engineering)

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Graduate Faculty

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Angela D. Davies - Assistant Professor

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Greg J. Gbur – Assistant Professor

Tsing-Hua Her - Assistant Professor

Terrill W. Mayes - Emeritus Professor

Patrick J. Moyer - Associate Professor

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Wei Cai – Professor

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Thomas R. Lucas – Professor

Stanislav Molchanov - Professor

Boris Vainberg - Professor

Department of Mechanical Engineering

Robert J. Hocken - Professor

Stuart T. Smith - Professor

Department of Computer Science

Teresa A. Dahlberg - Associate Professor

M. Taghi Mostafavi - Associate Professor

Kayvan Najarian – Assistant Professor

Department of Engineering Technology

Falih H. Ahmad - Associate Professor

Programs of Study

The M.S. and Ph.D. programs in Optical Science and Engineering are interdisciplinary involving six science and engineering departments and two Centers [Physics & Optical Science, Chemistry, Mathematics, Electrical & Computer Engineering, Mechanical Engineering & Engineering Science, and Computer Science, the Center for Optoelectronics & Optical Communications, and the Center for Precision Metrology.] The program is administered through the Department of Physics & Optical Science. The purpose of the program is to educate scientists and engineers who will develop the next generation of optical technology. The program emphasizes basic and applied interdisciplinary education and research in areas of optics that include:

- Optoelectronic devices and sub-assemblies
- Devices for telecommunications, sensors, and characterization
- Optical materials (semiconductors, polymer-organic and crystalline)
- Optical metrology
- Optical imaging
- Optical communication networks

Applications of this research include:

- Optical telecom and data-com
- High efficiency, tunable narrow bandwidth laser sources and detectors
- Smart structures for distributed sensing
- Wireless technologies for communications and remote sensing
- Materials and surface characterization
- Nanostructured optical devices
- Microelectronics
- Biosensing and medical imaging

A complete description of the research activity within the Optical Science and Engineering program can be accessed at the web address http://optics.uncc.edu .

Documents to Be Submitted for Admission

a. Official transcripts from all colleges and universities attended.

b. Official GRE scores.

c. Official TOEFL scores (if the previous degree was from a country where English is not the official language).

d. The UNC Charlotte application for graduate admission form.

e. A minimum of three letters of reference.

f. An essay detailing the applicant's motivation and career goals.

M.S. in Optical Science and Engineering

Additional Admission Requirements

In addition to fulfilling the university's general requirements for graduate admission at the Master's level, all applicants seeking admission into the Optics M.S. program must fulfill the university's general requirements for graduate admission at the M.S. level. Additional requirements for admission into the program are:

a. A baccalaureate or masters degree in Physics, Chemistry, Mathematics, Engineering, Optics, Computer Science, or a related field with a minimum undergraduate GPA of 3.0 overall and 3.0 (A = 4.0) in the major.

b. A minimal combined score of 1000 on the verbal and quantitative portions of the GRE, and satisfactory scores on the analytical and discipline specialty sections of the GRE.

c. A minimum score of 220 (computer-based test) or 557 (paper-based test) or 83 (Internet-based test)) on the TOEFL if the previous degree was from a country where English is not the official language.

d. Positive letters of recommendation.

e. Students may be required to take undergraduate courses determined by the Optics Program Committee on an individual basis. Such courses will be specified at the time of admission into the program.

Degree Requirements

The degree of Master of Science in Optical Science and Engineering is awarded for completion of scholarly research that advances the knowledge base in the field of that research. Evidence of this is demonstrated by a successful thesis defense. Additionally, recipients of this degree should demonstrate mastery of relevant subject matter and a potential for success, usually in a position with government or industry.

The minimum requirement for the M.S. degree in Optical Science and Engineering is 32 credit hours beyond the baccalaureate degree.

Each candidate for the M.S. degree in Optical Science and Engineering must

- *Present evidence of competency in the Core Curriculum,*
- *Complete 2 semesters (2 credit hours) of Seminar (OPTI 6110),*
- *Complete a minimum of 21 credit hours (7 courses) in formal courses which may include the Core Curriculum,*
- *Complete a minimum of 9 credit hours of thesis research(OPTI6991),*
- *Present a Plan of Study detailing all course and examination requirements,*
- *Present a M.S. Research Plan,*
- *Successfully defend the M.S. thesis.*

Admission to Candidacy

Students are admitted to candidacy upon completion of the Core Curriculum, appointment of a M.S. advisor, formation of an Advisory Committee, presentation of the Plan of Study, and approval of the Research Plan. These steps to candidacy must be completed within two years following admission to the program.

Core Curriculum

All graduates of the program must demonstrate competency in the Core Curriculum. Students may do so by completing the 5 Core Courses with a grade of B or better in each course. Well-prepared students may demonstrate competency in the Core Curriculum by earning a grade of pass on one or more of the five sections of a Core examination. In those cases, credit hours that would have been earned in the courses may be replaced by credit hours in OPTI 6991, Thesis Research, and/or other electives approved by the student's Advisory Committee and the Optics Program Director.

Thesis Advisor and Advisory Committee

Each student in the program must have a Thesis Advisor and an Advisory Committee before being admitted to candidacy. The student should select a thesis advisor before the end of the third semester of residency. The student and the thesis advisor jointly determine the advisory committee. The Thesis Advisor serves as Chair of the Advisory Committee and must be a member of the Optics Faculty at UNC Charlotte. The advisory committee must have at least 3 members, the majority of which must be members of the Optics Faculty. Composition of the Advisory Committee must be approved by the Optics Program Director.

Plan of Study

All students must prepare a Plan of Study before the end of the third semester following admission to the program. The Plan of Study should show in detail how the student will meet the 32 credit hour minimum. The Plan of Study must be approved by the Advisory Committee.

Research Plan

After successful completion of the Core Curriculum requirement and approval of the Plan of Study, the student will prepare a written Research Plan and an oral defense of that Plan presented in a public seminar. The Research Plan must be approved by the Advisory Committee. The Research Plan must demonstrate: (a) the student's knowledge of the relevant literature base, and (b) a research plan that, if successfully completed, will lead to an approved thesis.

Thesis

Each student will complete a minimum of 9 credit hours of thesis research. The student must present a written thesis to the Advisory Committee. The student must defend the

thesis at a presentation before the Optics Faculty. Upon approval of the written thesis and oral presentation by the Advisory Committee, the student has successfully completed the thesis requirement. The thesis must be written using a format acceptable to the Graduate School.

Residency Requirement

The student must satisfy the residence requirement for the program by completing 12 credit hours of continuous enrollment in coursework/dissertation credit. Residence is considered continuous if the student is enrolled in one or more courses in successive semesters until 12 credit hours are earned.

Time Limit for Completion of Program Requirements

All program requirements must be completed within 6 calendar years from the date the student is admitted into the program.

Transfer Credit Accepted

Up to 6 credit hours of approved coursework may be transferred from other accredited masters and doctoral programs. Only courses in which the student earned a grade of B or better (or its equivalent) can be transferred. No more than 6 credit hours of approved coursework taken as a post-baccalaureate student may be applied toward the degree. Credit for thesis research cannot be transferred.

Assistantships

Support for beginning graduate students is usually a teaching assistantship. Continuing students are often supported by research assistantships.

Comprehensive Examination

The thesis defense is the final examination.

Language Requirement

The program has no language requirement.

Ph.D. in Optical Science and Engineering

Additional Admission Requirements

All applicants seeking admission into the Optical Science and Engineering Ph.D. program must fulfill the university's general requirements for graduate admission at the Ph.D. level. Additional requirements for admission into the program are

a. A baccalaureate or masters degree in Physics, Chemistry, Mathematics, Engineering, Optics, Computer Science, or a related field with a minimum undergraduate GPA of 3.0 overall and 3.2 (A = 4.0) in the major. In the case a candidate presents a masters degree at application, a minimum graduate GPA of 3.2 (A = 4.0) on all graduate work is required.

b. A minimal combined score of 1100 on the verbal and quantitative portions of the GRE and satisfactory scores on the analytical and discipline specialty sections of the GRE.

c. A minimum score of 220 (computer-based test) or 557 (paper-based test) or 83 (Internet-based test)) on the TOEFL if the previous degree was from a country where English is not the official language.

d. Positive letters of recommendation.

e. Students may be required to take undergraduate courses determined by the Optics Program Committee on an individual basis. Such courses will be specified at the time of admission into the program.

Degree Requirements

The degree of Doctor of Philosophy in Optical Science and Engineering is awarded for completion of scholarly research that advances the knowledge base in the field of that research. Evidence of this is demonstrated by a successful dissertation defense. Additionally, recipients of this degree should demonstrate mastery of relevant subject matter and a potential for success in future research and teaching.

The minimum requirement for the Ph.D. degree in Optical Science and Engineering is 72 credit hours beyond the baccalaureate degree.

Each candidate for the Ph.D. degree in Optical Science and Engineering must

- *Present evidence of competency in the Core Curriculum,*
- *Complete 2 semesters (2 credit hours)of Seminar (OPTI 8110)during the first 2 semesters of residency and complete 1 semester (1 credit hour) of Seminar (OPTI 8110) during each academic year of residency in the program,*
- *Complete a minimum of 9 credit hours (3 courses) in formal courses having an OPTI prefix in addition to the Core Curriculum,*
- *Complete a minimum of 24 credit hours of dissertation research(OPTI8991),*
- *Present a Plan of Study detailing all course and examination requirements,*
- *Successfully complete the written and oral qualifying exam,*
- *Present a Ph.D. Research Plan,*
- *Successfully defend the Ph.D. dissertation.*

The remaining credit hours must be approved on a case-by-case basis by the student's Advisory Committee and the Optics Program Director.

A student in the Ph.D. program must maintain a minimum GPA of 3.0 in all coursework attempted for the degree. An accumulation of two C grades will result in termination of the student's enrollment in the program. A grade of U earned in any course will result in termination of the student's enrollment in the program.

Admission to Candidacy

Students are admitted to candidacy upon completion of the Core Curriculum with a GPA of 3.4 or better, appointment of a Ph.D. advisor, formation of an Advisory Committee, presentation of the Plan of Study, successful completion of the Qualifying Exam, and approval of the Research Plan. These steps to candidacy must be completed within two years following admission to the program.

Core Curriculum

All graduates of the program must demonstrate competency in the Core Curriculum. Students may do so by completing the 5 Core Courses with a grade of B or better in each course and a GPA of 3.4 or better in those courses. Failure to demonstrate competency in this manner will result in termination from the program. Well-prepared students may demonstrate competency in the Core Curriculum by earning a grade of pass on one or more of the five sections of a Core examination. In those cases, credit hours that would have been earned in the courses may be replaced by credit hours in OPTI 8991, Dissertation Research, and/or other electives approved by the student's Advisory Committee and the Optics Program Director.

Dissertation Advisor and Advisory Committee

Each student in the program must have a Dissertation Advisor and an Advisory Committee before being admitted to candidacy. The student should select a dissertation advisor before the end of the second year of residency. The student and the dissertation advisor jointly determine the advisory committee. The Dissertation Advisor serves as Chair of the Advisory Committee and must be a member of the Optics Faculty at UNC Charlotte. The advisory committee must have at least 4 members, the majority of which must be members of the Optics Faculty. Composition of the Advisory Committee must be approved by the Optics Program Director.

Plan of Study

All students must prepare a Plan of Study before the end of the third semester following admission to the program. The Plan of Study should show in detail how the student will meet the 72 credit hour minimum. The Plan of Study must be approved by the Advisory Committee.

Qualifying Exam

After successful completion of the Core Curriculum, students will have one opportunity to pass a written and oral qualifying examination administered by the Optics

Faculty. Failure to pass the qualifying examination will result in termination from the program.

Research Plan

After successful completion of the Core Curriculum requirement and approval of the Plan of Study, the student will prepare a written Research Plan and an oral defense of that Plan presented in a public seminar. The Research Plan must be approved by the Advisory Committee. The Research Plan must demonstrate: (a) the student's knowledge of the relevant literature base, and (b) a research plan that, if successfully completed, will lead to an approved dissertation. The Research Plan is typically prepared during 1 semester (1 credit hour) of Research Seminar (OPTI8691).

Dissertation

Each student will complete a minimum of 24 credit hours of dissertation research. The student must present a written dissertation to the Advisory Committee. The student must defend the dissertation at a presentation before the Optics Faculty. Upon approval of the written dissertation and oral presentation by the Advisory Committee, the student has successfully completed the dissertation requirement. The dissertation must be written using a format acceptable to the Graduate School.

Residency Requirement

The student must satisfy the residence requirement for the program by completing 20 credit hours of continuous enrollment in coursework/dissertation credit. Residence is considered continuous if the student is enrolled in one or more courses in successive semesters until 20 credit hours are earned.

Time Limit for Completion of Program Requirements

All program requirements must be completed within 8 calendar years from the date the student is admitted into the program.

Transfer Credit Accepted

Up to 30 credit hours of approved coursework may be transferred from other accredited masters and doctoral programs. Only courses in which the student earned a grade of B or better (or its equivalent) can be transferred. No more than 6 credit hours of approved

coursework taken as a post-baccalaureate student may be applied toward the degree. Credit for dissertation research cannot be transferred.

Assistantships

Support for beginning graduate students is usually a teaching assistantship. Continuing students are often supported by research assistantships.

Comprehensive Examination

The dissertation defense is the final examination.

Language Requirement

The program has no language requirement.

Core Curriculum

A student in either the M.S. or Ph.D. program should plan to complete the core curriculum, shown below, during the first year of residence. Courses taken after completion of the core curriculum are elective, but must be approved by the student's Advisor and Advisory Committee. Courses in the core curriculum are prerequisites to elective OPTI courses. Students in the M.S. program are to enroll in courses having a 6XXX number. Students in the Ph.D. program are to enroll in courses having an 8XXX number.

Fall

OPTI 6101/8101 and	Mathematical Methods of Optical Science Engineering
OPTI 6102/8102	Principles of Geometrical and Physical Optics
OPTI 6105/8105	Fundamentals of Light/Matter Interactions
OPTI 6110/8110	Seminar

Spring

OPTI 6104/8104	Electromagnetic Waves
OPTI 6211/8211	Introduction to Modern Optics
OPTI 6110/8110	Seminar

Courses in Optical Science and Engineering (OPTI)

M.S. Degree

CORE CURRICULUM

OPTI 6101. Mathematical Methods of Optical Science and Engineering. (3). Topics include: matrix theory, series and Frobenius methods of solutions to ordinary differential equations, separation of variables techniques for partial differential equations, special functions, Fourier series, and transform methods. Topical coverage will emphasize applications specific to the field of optics. Three lecture hours per week. (Fall)

OPTI 6102. Principles of Geometrical and Physical Optics. (3) Ray analysis of common optical elements (mirrors, lenses and systems of lenses, prisms). Reflection and refraction at plane and spherical surfaces, thin and thick lenses, lensmaker's equation, field of view, and numerical aperture. Wave properties of light, superposition of waves, diffraction, interference, polarization, and coherence. Optics of thin films. Three lecture hours per week. (Fall)

OPTI 6104. Electromagnetic Waves. (3) Program. Maxwell's equations, the electromagnetic wave equation, and electromagnetic wave functions. Waves in dielectric and conducting media, dispersion. Reflection, refraction, transmission, internal reflection, and evanescent waves at an interface. Intensity. Introduction to guided waves. Three lecture hours per week. (Spring)

OPTI 6105. Fundamentals of Light/Matter Interactions. (3) Quantized nature of light and matter; particle in a box; electronic structure of atoms, molecules, solids; transition rates, oscillator model of light-matter interactions; and examples of different material classes. Three lecture hours per week. (Fall)

OPTI 6211. **Introduction to Modern Optics. (3)** Prerequisites: OPTI 6102 or permission of the instructor. Fourier analysis and holography, Coherence. Introduction to light production and detection. Optical modulation, including EO effect, Kerr effect, amplitude modulation, magnetooptic effect, photoelastic effect, and acousto-optic effect. Introduction to nonlinear optics. Photonic switching. Three lecture hours per week. (Spring)

OPTI 6110. Seminar. (1) Prerequisite: Admission to Optics M.S. program. Topics include: discussion and analysis of topics of current interest in optics; effective techniques for making presentations and utilizing library materials; ethical issues in science and engineering. Attendance required. May be repeated for up to 4 hours credit. One semester of seminar is required of all students in the Optics M.S. program during each of their first two semesters of residence. After the first two semesters, students are required to attend a minimum number of designated lectures. One to two hours per week. Graded Pass/Fail. (Fall/Spring)

THESIS RESEARCH

OPTI 6991. Thesis Research. (1 – 3) Prerequisite: Admission to candidacy. Research for the thesis. May be repeated for a total of 18 credit hours. Graded Pass/Fail. (Fall/Spring/Summer)

OPTI 7999. Masters Residence. (1) Prerequisite: OPTI 6991. Required of all Optics M.S. students who have completed all requirements for the degree except the thesis defense and are taking no other courses. May be repeated for credit. Credit for this course does not count toward the degree. Graded Pass/Fail. (Fall/Spring/Summer)

M.S. OPTICS ELECTIVES

OPTI 6000. Selected Topics in Optics. (3). Prerequisite: Consent of Optics Program Director. Selected topics in optics from areas such as medical optics, adaptive optics, all optical networks, etc. May be repeated for up to 6 hours of credit with consent of the Optics Program Director. (Fall/Spring/Summer)

OPTI 6103. **Light Sources and Detectors. (3)** Prerequisite: OPTI 6211. The nature of light, blackbody radiation. Optical sources, including discharge lamps, light-emitting diodes, gas and solid state lasers. Quantum wells. Continuous wave and pulsed (mode-locked, Q-switched) lasers. Selected solid-state laser systems. Light detection, including thermal and quantum detectors, photomultiplier tubes, diode detectors. Noise in light sources and detectors. Three lecture hours per week. (Fall, Odd Years)

OPTI 6201. Fourier Optics and Holography. (3) Prerequisite: OPTI 6102 and OPTI 6104. Principles of scalar, Fresnel, and Fraunhofer diffraction theory. Coherent optical data processing. Optical filtering and data processing. Holography. Three lecture hours per week. (Fall, Even Years)

OPTI 6205. Advanced Optical Materials. (3) Prerequisites: OPTI 6104 and OPTI 6105 or ECGR 6133/8133. Molecular optical materials including fabrication methods. Luminescence centers; quenching. Nonlinear optics, including higher order terms of the susceptibility tensor. Photonic crystals. Three lecture hours per week. (Fall, Odd Years)

OPTI 6212. Integrated Photonics. (3) Prerequisites: OPTI 6102 and OPTI 6104. Theory and application of optical waveguides, free-space micro-optics, and integrated photonic devices. Fabrication and integration techniques, including motivations for choice of approach (hybrid vs. monolithic, materials, size, performance, etc). Modeling and simulation. Students will be required to work with mathematical packages such as Matlab and/or Mathematica to illustrate key concepts and to implement beam propagation/optical modeling simulations. Three lecture hours per week. (Spring, Odd Years)

OPTI 6221. **Optical Communications. (3)** Prerequisite: OPTI 6102 and OPTI 6103. Introduction to optical communications and basic communication block such as lasers, optical modulators, and optical transceivers. Review of fibers (attenuation, dispersions, etc.). Optical amplifiers. Passive and active photonic components such as tunable lasers and filters. Coherent and incoherent detection. Signal processing, photonic switching, and point-to-point links / connections. Three lecture hours per week. (Spring, Even Years)

OPTI 6222. **Optical Communication Networks. (3)** Prerequisite: OPTI 6221 or graduate standing in ECE, CS, or IT. Optical signal coding, multiplexing and de-

multiplexing. Time-domain medium access (TDM (SONET) and TDMA), wavelength-division multiplexing (WDM and WDMA). Optical networks, add-drop multiplexing (OADM), switching and routing technologies, Dispersion management. Optical clock and timing recovery. Optical amplification, wavelength conversion, transport, and networking protocols. Broadband ISDN concepts. Access, metro, and long-haul network topologies. Three lecture hours per week. (Fall, Even Years)

OPTI 6241. Optical System Function and Design. (3) Prerequisite: OPTI 6102. Advanced study of telescopes, microscopes, cameras, off-axis imaging systems, stops, apertures, multiple lenses, use and selection of ray trace computer codes. Three lecture hours per week. (Spring, Even Years)

OPTI 6242. Optical Propagation in Inhomogeneous Media. **(3)** Prerequisite: OPTI 6102 and OPTI 6104. Advanced study of free space propagation, scattering, and scintillation of Gaussian and uniform beam waves. Random processes, weak fluctuation theory, propagation through complex paraxial optical systems (Spring, Odd Years)

OPTI 6244. High Speed Photonics and Optical Instrumentation. (3) Prerequisite: OPTI 6103 and OPTI 6104. Study of instrumentation used for generation, detection, and manipulation of light in optical circuits. Topics include ultrashort pulse generation, photon-phonon interactions, 2^{nd} & 3^{rd} harmonic generation, squeezed light, optical tweezers, OPO, electro-optic modulators, selective polarizers, optical switches, amplifiers, multiplexing and mixing schemes, and application of CCD and CMOS cameras and detectors. Three lecture hours per week. (Spring, Odd Years)

OPTI 6261. Modern Coherence Theory. **(3)** Prerequisite: OPTI 6102 and OPTI 6104. Stochastic processes. Second order coherence of scalar and vector wavefields, radiation and states of coherence. Quantum wavefields. (Fall, Odd Years)

OPTI 6271. Advanced Physical Optics (3) Prerequisite: OPTI 6101, OPTI 6102, and OPTI 6104. Advanced study of electromagnetic wave propagation, stratified media, physics of geometrical optics, polarization and crystal optics, absorption and dispersion, interference, propagation and diffraction. Three lecture hours per week. (Spring, Odd Years)

OPTI 6281. Modern Optics Laboratory. (3) Prerequisite: OPTI 6102. Selected experiments in areas of modern optics such as fiber optics, interferometry, spectroscopy, polarization, optical metrology, and holography. Six laboratory hours per week. (Spring, Even Years)

OPTI 6691. Research Seminar. (1 - 3) Prerequisite**:** Consent of the Optics Program Director. A seminar in which independent study may be pursued by the student, or a group of students, under the direction of a professor. May be repeated for up to a maximum of 6 credit hours. (Fall/Spring/Summer)

Ph.D. Degree

CORE CURRICULUM

OPTI 8101. Mathematical Methods of Optical Science and Engineering. (3) See OPTI 6101 for Course Description.

OPTI 8102. Principles of Geometrical and Physical Optics. (3) See OPTI 6102 for Course Description.

OPTI 8104. Electromagnetic Waves. (3) See OPTI 6104 for Course Description.

OPTI 8105. Fundamentals of Light/Matter Interactions. (3) See OPTI 6105 for Course Description.

OPTI 8211. **Introduction to Modern Optics. (3)** Prerequisites: OPTI 8102 or permission of the instructor. See OPTI 6211 for Course Description.

OPTI 8110. Seminar. (1) Prerequisite: Admission to Optics Ph.D. program. Topics include: discussion and analysis of topics of current interest in optics; effective techniques for making presentations and utilizing library materials; ethical issues in

science and engineering. Attendance required. May be repeated for up to 6 hours credit. One semester of seminar is required of all students in the Optics Ph.D. program during each of their first two semesters of residence. After the first two semesters, students are required to attend a minimum number of designated lectures. One to two hours per week. Graded Pass/Fail. (Fall/Spring)

PH.D. DISSERTATION

OPTI 8991. Dissertation Research. (1 – 3) Prerequisite: Admission to candidacy. Research for the dissertation. May be repeated for a total of 45 credit hours. Graded Pass/Fail. (Fall/Spring/Summer)

OPTI 9999. Doctoral Residence. (1) Prerequisite: OPTI 8991. Required of all Optics Ph.D. students who have completed all requirements for the degree except the dissertation defense and are taking no other courses. May be repeated for credit. Credit for this course does not count toward the degree. Graded Pass/Fail. (Fall/Spring/Summer)

PH.D. OPTICS ELECTIVES

OPTI 8000. Selected Topics in Optics. (3) Prerequisite: Consent of Optics Program Director. See OPTI 6000 for Course Description.

OPTI 8103. **Light Sources and Detectors. (3)** Prerequisite: OPTI 8211. See OPTI 6103 for Course Description.

OPTI 8201. Fourier Optics and Holography. (3) Prerequisite: OPTI 8102 and OPTI 8104. See OPTI 6201 for Course Description.

OPTI 8205. Advanced Optical Materials. (3) Prerequisites: OPTI 8104 and OPTI 8105 or ECGR 6133/8133. See OPTI 6205 for Course Description.

OPTI 8212. Integrated Photonics. (3) Prerequisites: OPTI 8102 and OPTI 8104. See OPTI 6212 for Course Description.

OPTI 8221. **Optical Communications. (3)** Prerequisite: OPTI 8102 and OPTI 8103. See OPTI 6221 for Course Description.

OPTI 8222. **Optical Communication Networks. (3)** Prerequisite: OPTI 8221. See OPTI 6222 for Course Description.

OPTI 8241. Optical System Function and Design. (3) Prerequisite: OPTI 8102. See OPTI 6241 for Course Description.

OPTI 8242. Optical Propagation in Inhomogeneous Media. **(3)** Prerequisite: OPTI 8102 and OPTI 8104. See OPTI 6242 for Course Description.

OPTI 8244. High Speed Photonics and Optical Instrumentation. (3) Prerequisite: OPTI 8103 and OPTI 8104. See OPTI 6244 for Course Description.

OPTI 8261. Modern Coherence Theory. **(3)** Prerequisite: OPTI 8102 and OPTI 8104. See OPTI 6261 for Course Description.

OPTI 8271. Advanced Physical Optics (3) Prerequisite: OPTI 8101, OPTI 8102, and OPTI 8104. See OPTI 6271 for Course Description.

OPTI 8281. Modern Optics Laboratory. (3) Prerequisite: OPTI 8102. See OPTI 6281 for Course Description.

OPTI 8691. Research Seminar. (1 - 3) Prerequisite**:** Consent of Optics Program Director. See OPTI 6691 for Course Description.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: October 13, 2005

RE: Request to revise the requirements for the Master's Degree in Civil Engineering

The request to revise the requirements for the Master's Degree in Civil Engineering was approved by the Graduate Council on September 20, 2005 and by the Faculty Council on the September 26, 2005 Consent Calendar for implementation Spring Semester, 2006.

Revised Catalog Copy:

Capstone Experiences

Students pursuing a Master's degree in Civil Engineering have three options to complete the 30-credit hour program. Students may elect to complete 24 credit hours of coursework plus a 6-credit hour thesis; 27 credit hours of coursework plus a 3-credit hour directed project; or 30 credit hours of coursework plus a comprehensive examination. All three options require the formation of a program committee as described earlier in this document. The thesis and project options require students to submit a written thesis or project documentation, and orally defend it before their program committee.

The comprehensive examination is the third option is written (oral exam may be allowed – but only under special circumstances and will require the approval of the Department

Chair and the student's advisor.) A student's exam will be scheduled when he/she has at least 24 hours of course credit completed or in progress. The student's graduate advisor and the examining committee will coordinate the examination (to be offered once in the Fall and once in the Spring semesters), preparing the exam with the assistance of the other members of the student's program committee. The exam will measure the student's mastery of theories and applications in the selected area of specialization in the discipline. Students will have only two opportunities to receive passing marks on the examination.

**(Eliminate the current section of "Comprehensive Examination" in the catalog)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Julie Putnam, Administrative Assistant to Faculty Governance

DATE: October 13, 2005

RE: Request to establish EMGT 6952: Engineering Systems Optimization

The request to establish EMGT 6952: Engineering Systems Optimization was approved by the Graduate Council on September 20, 2005 and by the Faculty Council on the September 26, 2005 Consent Calendar for implementation Spring Semester, 2006.

Catalog Copy:

EMGT 6952. Engineering Systems Optimization. (3) Prerequisite: Calculus and Linear Algebra or consent of the instructor. The main objective of this course is to develop fundamental problem solving skills for engineers and engineering managers using techniques for optimizing engineering systems. A systems engineering approach will be followed to analyze practical applications from different engineering disciplines and to optimize complex systems. Model formulation, sensitivity analysis, special cases, solutions using commercially available software applications and practical implementation considerations will be emphasized. *(On demand)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Cathy Sanders, Director of Assessment and Faculty Governance

DATE: April 20, 2005

RE: Request to Establish INES 8101, 8102, 8110, and 8690

The request to establish INES 8101, 8102, 8110, and 8690 was approved by the Graduate Council on March 2, 2005 and by the Faculty Council on the April 5, 2005 Consent Calendar for implementation.

Catalog Copy**:**

INES 8101 Environmental Systems (3). Prerequisite: Admission into the INES PhD program. This course examines the principles of energy and mass transport as applied to the atmosphere, hydrosphere, lithosphere and the Earth's biogeochemical systems and how these impact human activities and infrastructure. Emerging environmental issues and technologies in the areas of environmental impact due to human activities and natural disasters, and environmental sustainability including industrial ecology, waste minimization and recycling, will also be examined. (*Fall or Spring*).

INES 8102 Infrastructure Systems (3). Prerequisite: Admission into the INES PhD program. Overview of urban infrastructural development. Sustainable design features for facilities including municipal, transit, industrial, agricultural, telecommunications, and waste management. Impact of infrastructure development on environmental management including storm water quality and quantity, soil and channel erosion, urban air quality, sprawl, and waste production, treatment, and storage. (*Fall or Spring*).

INES 8110 Acquisition and Analysis of Scientific Data (3). Prerequisite: Admission into the INES PhD program. The study of theories and techniques for acquiring and analyzing scientific data and information related to the analysis, design and management of the infrastructure and the environment. Includes pertinent aspects of data analysis such as statistical analysis, uncertainty, detection limits, correlation methods, trend analysis, and data management/warehousing. Includes applications of GIS and non-destructive assessment technologies to data acquisition. (*Fall or Spring*).

INES 8690 Seminar (1). Prerequisite: Admission into the INES PhD program. Each student will be required to actively participate in program seminars delivered by student researchers, faculty and invited speakers. These seminars will be advertised to the campus and professional communities. Participation in these seminars will count for a total of 3 credits (1 credit for each semester). Prior to graduation, each student will make at least one seminar presentation and provide at least one formal critique of a presentation in this course. Can be repeated for credit. (*Fall and/or Spring*).

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Cathy Sanders, Director of Assessment and Faculty Governance

DATE: April 6, 2005

RE: Request to make minor changes to Civil Engineering Technology curriculum-Construction Engineering Technology Emphasis

The request to make minor changes to Civil Engineering Technology curriculum-Construction Engineering Technology Emphasis was approved by the Chair of the Undergraduate Course and Curriculum Committee on April 1, 2005 for implementation.

Summary**:**

1. add a requirement for a major elective laboratory (1 credit hour) to the existing construction engineering technology emphasis
2. replace one directed elective requirement with a major elective requirement,
3. modify language for science elective to match previously approved lower division language allowing students to select from Chemistry 1111, 1251, or Geology 1200. Currently, the construction emphasis requires 63 credits in the upper division while the general civil engineering technology emphasis requires 64 upper division credits in the upper division. The general civil engineering technology emphasis already requires the major elective laboratory. This change brings the required number of credits for the BSET degree in Civil Engineering Technology to 64 credits in the upper division in both tracks.

Catalog Copy:

CIVIL ENGINEERING TECHNOLOGY PROGRAM

General Civil Emphasis

Junior Year

ETGR 3071 Engineering Tech. Prof. Seminar (W)..... 1

ETCE 3111 Structural Analysis I..... 3

ETCE 3121 Foundations and Earthwork..... 3

ETCE 3151 Soil Testing Laboratory (W)..... 1

ETGR 3222 Engineering Economics..... 3

Directed Elective (see Note a)..... 3

14

ETCE 3112 Structural Analysis II..... 3

ETCE 3132 Hydraulics..... 3

ETGR 3171 Engineering Analysis I..... 3

ETCE 3150 Hydraulics & Materials Lab (W)..... 1

Directed Electives (see Note a)..... 6

16

Senior Year

ETCE 3212 Structural Steel Design..... 3

ETCE 3262 Intro to Environmental Engineering..... 3

Major Elective Laboratory (W)..... 1

ETCE 3243 Project Management Technology..... 3

Science Elective with Laboratory (CHEM 1251 or 1111 or GEOL 1200..... 4

Major Elective (see Note b)..... 3

17

ETCE 3642 Senior Design Project (W,O)..... 2

ETCE 3211 Reinforced Concrete Design..... 3

ETCE 3241 Highway Design & Construction..... 3

Major Electives (see Note b)..... 6

Directed Elective (see Note a)..... 3

17

CIVIL ENGINEERING TECHNOLOGY PROGRAM

Construction Emphasis

Junior Year

ETGR 3071 Engineering Tech. Prof. Seminar (W)..... 1

ETCE 3111 Structural Analysis I..... 3

ETCE 3121 Foundations and Earthwork..... 3

ETCE 3151 Soil Testing Laboratory (W)..... 1

ETGR 3222 Engineering Economics..... 3

Directed Elective (see Note a)..... 3

14

ETCE 3112 Structural Analysis II..... 3

ETCE 3132 Hydraulics..... 3

ETGR 3171 Engineering Analysis I..... 3

ETCE 3150 Hydraulics & Materials Lab (W)..... 1

ETCE 3281 Cost Estimating..... 3

Directed Elective (see Note a)..... 3

16

Senior Year

ETCE 3212 Structural Steel Design..... 3

Major Elective Laboratory (W)..... 1

ETCE 3243 Project Management Technology..... 3

Science Elective with Laboratory (CHEM 1251 or 1111 or GEOL 1200..... 4

Directed Elective (see Note a)..... 3

Major Elective (see Note b)..... 3

17

ETCE 3642 Senior Design Project (W,O)..... 2

ETCE 3211 Reinforced Concrete Design..... 3

ETCE 3293 Building Systems..... 3

ETCE 3241 Highway Design & Construction..... 3

Major Elective (see Note b)..... 3

Directed Elective (see Note a)..... 3

17

Notes regarding Curriculum Outlines.

a. Directed electives may be major field courses or general education courses. They are chosen jointly by student and advisor to ensure that all graduation requirements are met.

b. Major elective courses are approved by the Department as major electives for the respective program. A list is maintained in and published by the Department.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Cathy Sanders, Director of Assessment and Faculty Governance

DATE: February 1, 2005

RE: Request to establish MEGR 2240: Computational Methods for Engineers and make associated changes to the ME & ES curriculum

The request to establish MEGR 2240: Computational Methods for Engineers and make associated changes to the ME & ES curriculum was approved by the Chair of the Undergraduate Course and Curriculum Committee on January 28, 2005 for implementation.

Catalog Copy (changes in blue):

MEGR 2240. Computational Methods for Engineers. (3)

Prerequisites: MEGR 2141 and MATH 2241. Automated engineering analysis and synthesis techniques based on software engineering principles. Overview of data representation and computing languages. Program development using programming languages and off-the shelf software packages. Study of numerical methods, potential errors, and computational stability. emphasis on effective design, testing, and debugging practices. *(Fall, Spring)*

Change in hours:

MEGR 2180. Manufacturing Systems. (3)

MEGR 3152. Mechanics and Materials Laboratory. (2) (W)
MEGR 3251. Thermal/Fluids Laboratory (2) (W)

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Cathy Sanders, Director of Assessment and Faculty Governance

DATE: January 6, 2005

RE: Request to add a co-requisite for ENGR 1201

The request to add a co-requisite for ENGR 1201 was approved by the Chair of the Undergraduate Course and Curriculum Committee on December 21, 2004 for implementation.

Catalog Copy (changes in blue):

ENGR 1201. Introduction to Engineering Practices and Principles I. (2) Co-requisite: MATH 1241. An introduction to the different disciplines within engineering; the College's computing system; academic, personal and professional development; teamwork; project planning; engineering design; engineering calculations; and oral and written communication skills within a multi-disciplinary format.

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Cathy Sanders, Director of Assessment and Faculty Governance

DATE: December 22, 2004

RE: Request to revise prerequisites and co-requisites for the Electrical and Computer Engineering Curriculum

The Request to Request to revise prerequisites and co-requisites for the Electrical and Computer Engineering Curriculum was approved by the chair of the Undergraduate Course and Curriculum Committee on December 17, 2004, for immediate implementation.

Catalog Copy **(changes in blue):**

1. [Add Differential Equations (MATH 2171) and Physics for Science and Engineering II (PHYS 2102) as co-requisites for Network Theory I (ECGR 2111)]

ECGR 2111. Network Theory I. (3) Co-requisites: ECGR 2155, **MATH 2171, PHYS 2102,** or permission of the Department. Prerequisite: MATH 1242 and PHYS 2101. Introduction to Kirchoff's laws and terminal equations. Circuit analysis techniques and network theorems. Singularity functions and signals. Transient and natural response of first and second order networks. State variable analysis. *(Fall, Spring) (Evenings)*

2. [Add Physics for Science and Engineering II (PHYS 2102) as prerequisite and with a grade of C or better for all necessary prerequisites for Network Theory II (ECGR 2112)]

ECGR 2112. Network Theory II. (3) Prerequisites: ECGR 2111, **MATH 2171, and PHYS 2102, all** with a grade of C or better. Continuation of ECGR 2111. Introduction to sinusoidal steady state. Time frequency domain analysis. Power and energy. Two port networks. Fourier series. Introduction to Fourier and Laplace transforms. *(Fall, Spring, Summer) (Evenings)*

3. [Remove the word Co-requisite from Basic electrical Engineering I (ECGR 2161)]

ECGR 2161. Basic Electrical Engineering I. (3) Prerequisite: PHYS 2101. Fundamental concepts and methods of analysis of D.C. and A.C. circuits, elementary operation of electronic devices. Not open to electrical Engineering majors. *(Fall) (Evenings)*

4. [Remove Introduction to Computer Science (ITCS 1214 as prerequisite for Logic system Design I (ECGR 2181)]

5. [Add Calculus I (MATH 1241) as a prerequisite for Logic System Design I (ECGR 2181)]

ECGR 2181. Logic System Design I. (3) Co-requisite: ECGR 2155 or permission of the Department. Prerequisite **MATH 1241** or permission of the Department. Introduction to Boolean algebra; mixed logic; design of combinational circuits; introduction to sequential systems; MSI building blocks; includes laboratory design projects. *(Fall, Spring)*

6. [Remove Calculus III (MATH 2241) as a prerequisite to Introduction to Electromagnetic Fields (ECGR 3121)]

ECGR 3121. Introduction to Electromagnetic Fields. (3) Prerequisites: ECGR 2112 with a grade of C or better. A study of electric and magnetic fields using the vector formulation. Vector analysis. Electrostatics: potential functions, dielectrics, capacitance, energy, and forces associated with electric fields, solution of Laplance's and Poisson's equations. Magnetostatics: vector potential functions, Lorentz forces, hysteresis, magnetic polarization and induction, and energy. Gauss's, Ampere's, Faraday's laws, etc., leading to the Maxwell's equations. *(Fall, Spring)*

7. [Remove Network Theory I (ECGR 2111) as a prerequisite for Fundamentals of Electronics and Semiconductors (ECGR 3131)]

ECGR 3131. Fundamentals of Electronics and Semiconductors. (3) Prerequisite: ECGR 2112 with a grade of C or better. Study of the fundamental concepts and applications of semiconductor devices. Diode characteristics and applications, including clipping and rectifier circuits. MOS, JFET, and bipolar transistor fundamentals, including D.C. biasing and small-signal analysis of single-stage amplifiers. Operational amplifier fundamentals. *(Fall, Spring)*

8. [Remove Network Theory II (ECGR 2112) as a prerequisite for Electronics (ECGR 3132)]

ECGR 3132. Electronics. (3) Prerequisites: ECGR 3131 with a grade of C or better. Low and high-frequency analysis of transistor amplifiers. Multistage and feedback amplifier design. Stability and oscillation. Operational amplifier design and applications. *(Spring, Summer)*

9. [Remove electromagnetic Waves (ECGR 3122) and Quantum Mechanics I (PHYS 4241) as prerequisites for Solid State Microelectronics I (ECGR 3133)]

10. [Add Introduction to Modern Physics (PHYS 3141) as a prerequisite for Solid State Microelectronics I (ECGR 3133)]

ECGR 3133. Solid State Microelectronics I. (3) Prerequisites: ECGR 3121, **PHYS 3141** or permission of the Department. Simple crystal structures, energy bands, and charge carriers in semiconductors, distribution functions for photons and electrons, optical and electrical properties, carrier diffusion, generation, and recombination. *(Fall)*

11. [Remove Senior Standing, Senior Design I (ECGR 3253), Senior Design II (ECGR 3254) or permission of the Department as co-requisites and prerequisites for Professional Practice (ECGR 3159)]

12. [Add Multidisciplinary Professional Development (ENGR 3295) as a prerequisite for Professional Practice (ECGR 3159)]

ECGR 3159. Professional Practice. (2) Prerequisites: ENGR 3295. Ethics; safety and liability in the manufacturing workplace; product design; product development; cost estimating for non-recurring engineering work; production planning; Total Quality Management; and effective technical presentation. *(Spring, Summer)*

13. [Add Logic System Design II (ECGR 3181) as a prerequisite for Digital Electronics (ECGR 3182)]

14. [Remove Logic System Design I (ECGR 2181) ad a prerequisite for Digital Electronics (ECGR 3182)

ECGR 3182. Digital Electronics. (3) Prerequisites: **ECGR 3131 and 3181**, both with a grade of C or better. Bipolar and field-effect transistors, switching characteristics, device models, logic families. Memory devices, one-shots, Schmitt triggers, logic gates, drivers. Use of logic analyzers. *(Spring, Summer)*

15. [Remove BSEE degree and Systems, Electronics Laboratory (ECGR 3155) and Electromagnetic and Electronic Devices Laboratory (ECGR 3156) as prerequisites for Senior Design I (ECGR 3253)]

16. [Remove BSC_pE degree, ECGR 2155, ECGR 2156, and ECGR 2255 (written after BSC_pE) as prerequisites for Senior Design I (ECGR 3253)]

ECGR 3253. Senior Design I. (2) (W) (O) Co-requisite and Prerequisites: Senior standing in engineering, ECGR 2155, 2156, 3111, and 3131 all with a grade of C or better. A project-oriented course stressing the planning and design of experiments to support the student's project. Formation of the design problem and specification. *(Fall, Spring)*

17. [Add with a grade of C or better for the prerequisite Electromagnetic Waves (ECGR 3122) for Acoustics (ECGR 4123)]

ECGR 4122. Acoustics. (3) Prerequisite: ECGR 3122 **with a grade of C or better.** Vibrations and simple vibrating systems; radiating systems; plane waves of sound, dynamic analogies, microphones and other acoustic transducers; acoustic measurements. *(On demand)*

18. [Add with a grade of C or better for the prerequisite ECGR 3111 for Analog and Digital Communication (ECGR 4123)]

ECGR 4123. Analog and Digital Communication. (3) Prerequisite: ECGR 3111, **with a grade of C or better.** Analysis and transmission of signals, including analog communication systems (amplitude and frequency modulation, effect of noise); digital communications systems (pulse code modulation, data transmission systems phase-shift keying, and frequency-shift keying, effect of noise). *(Fall) (Evenings)*

19. [Add Introduction to Electromagnetic Fields (ECGR 3121), Modern Physics (PHYS 3141) as prerequisites, and with a grade of C or better for all necessary prerequisites for Foundation of Optical Engineering (ECGR 4125)]

20. [Remove Electromagnetic Waves (ECGR 3122) and PHYS 2241 as prerequisites for Foundation of Optical Engineering (ECGR 4125)]

ECGR 4125. Foundation of Optical Engineering. Same as ECGR 5125. Prerequisites: ECGR 3121 and PHYS **3141, both with a grade of C or better** or permission of the Department. The engineering aspects and applications of modern optics, optical communications, optical materials, optical devices, basic optical fiber and integrated optics, optical signals, and optical networks, basic Fourier optics, and methods in optical signal processing. Signal and data processing, principles of integrated optics. *(Fall)*

21. [Add with a grade of C or better for the prerequisite ECGR 4131 for Analog Integrated Circuits Design (ECGR 4132)]

ECGR 4132. Analog Integrated Circuits Design. (3) Same as ECGR 5132. Prerequisite: ECGR 4131, **with a grade of C or better** or Permission of the Department. Topics include analog MOS modeling, design of current mirrors, references, and operational amplifiers. Both hand analysis and SPICE simulation utilized. *(Spring)*

22. [Add with a grade of C or better for the prerequisite ECGR 3133 for Solid State and Semiconductor Microelectronics II (ECGR 4134)]

ECGR 4134. Solid State and Semiconductor Microelectronics II. (3) Prerequisites: ECGR 3133 **with a grade of C or better** or permission of the Department. PN-junctions and Schottky junctions; bipolar and field effect transistors; optoelectronic and heterojunction devices; lithography and integrated circuits; microwave devices; light emitting devices and detectors; quantum devices using superlattices; quantum wells and quantum dots; material preparation and characterization; and measurement techniques. *(Spring)*

23. [Add with a grade of C or better for the prerequisite ECGR 3132 for Device Electronics for Integrated Circuits (ECGR 4137)]

ECGR 4137. Device Electronics for Integrated Circuits. (3) Same as ECGR 5137. Prerequisites: ECGR 3132 with a grade of C or better or permission of the Department. The basic operating principles of electronic devices in integrated circuits are treated. The physical models of these devices are discussed. Graduate students are required to carry out laboratory experimentation. *(Fall) (Evenings)*

24. [Remove ECGR 4133 as a prerequisite for Thin Film Materials and Devices (ECGR 4138)]

25. [Add Solid State Microelectronics I (ECGR 3133 as a prerequisite and with a grade of C or better for all necessary prerequisites for Thin Film Materials and Devices (ECGR 41380]

ECGR 4138. Electronic Thin Film Materials and Devices. (3) Same as ECGR 5138. Prerequisite: ECGR 3132 **or 3133, both with a grade of C or better** or permission of the Department. Applications of thin films in microelectronics/optoelectronics manufacturing processes; vacuum technology, deposition techniques, and the characterization methods relevant to optoelectronic applications; thin film applications such as metallization, silicide formation, light emitting diodes (LED) and lasers, and doping of semiconductors. *(Fall)*

26. [Add with a grade of C or better for the prerequisite ECGR 3181 for Introduction to VHDL (ECGR 4146)]

ECGR 4146. Introduction to VHDL. (3) Same as ECGR 5146. Prerequisites: ECGR 3181, **with a grade of C or better** and knowledge of a computer language, or permission of the Department. Introduction to VHSIC Hardware Description Language (VHDL) including VHDL-based high-level design of microelectronic systems, VHDL programming, and VHDL synthesis; emphasis on learning and using industry-standard VHDL tools. *(Fall)*

27. [Remove senior standing as a prerequisite for Introduction to Robotics (ECGR 4161)]

ECGR 4161. Introduction to Robotics. (3) Prerequisites: ECGR 2103 or MEGR 2101. Modeling of industrial robots including homogeneous transformations, kinematics, velocities, static forces, dynamics, computer animation of dynamic models, motion trajectory planning, and introduction to vision, sensors, and actuators (dual-listed with MEGR 4127). *(Fall)*

28. [Remove PHYS 2241 as a prerequisite for Laser Electronics (ECGR 4165)]

29. [Add Modern Physics (PHYS 3141) as a prerequisite and with a grade of C or better for all necessary prerequisites for Laser Electronics (ECGR 4165)]

ECGR 4165. Laser Electronics. (3) Same as ECGR 5165. Prerequisites: ECGR 3132 and **PHYS 3141, with a grade of C or better** or permission of the Department. Laser oscillation, excitation, amplification, dispersion, and absorption. Basic principles of quantum electronics, general characteristics of lasers, semiconductor lasers, solid state lasers, gas lasers, laser switching and modulation, CW and pulsed lasers which includes, Q-switching, mode locking, and other techniques for short pulse generation. Basic spectroscopy, nonlinear effects, laser processing, and laser. *(Spring)*

30. [Remove Logic Systems Design I (ECGR 2181) as a prerequisite for Digital System Testing (ECGR 4182)]

31. [Add Logic System Design II (ECGR 3181) as a prerequisite for Digital System Testing (ECGR 4182)]

ECGR 4182. Digital System Testing. (3) Prerequisite: **ECGR 3181** with a grade of C or better or permission of the Department. System testing; Boolean difference; D-algorithm; checking experiments; redundancy, computer-aided digital test systems. *(Spring)*

32. [Remove Electromagnetic waves (3122) and PHYS 2241 as prerequisites for Foundation of Optical Engineering (ECGR 4186)]

33. [Add Introduction to Electromagnetic Fields (ECGR 3121) and Modern Physics (PHYS 3141) as prerequisites for Foundation of Optical Engineering (ECGR 4186)

ECGR 4186. Foundation of Optical Engineering. (3) Same as ECGR 5125. Prerequisites: **ECGR 3121 and PHYS 3141** or permission of the

Department. The engineering aspects and applications of modern optics, optical communications, optical materials, optical devices, basic optical fiber and integrated optics, optical signals, and optical networks, basic Fourier optics, and methods in optical signal processing; signal and data processing, principles of integrated optics. *(Fall)*

34. Add with a grade of C or better for all necessary prerequisites for VLSI Systems Design (ECGR 4433)

ECGR 4433. VLSI Systems Design. (3) Same as ECGR 5133. Prerequisite: ECGR 3181 and 3131, **both with a grade of C or better** or permission of the Department. Analysis, design, and synthesis of very large scale integrated circuits. A project-oriented course relying heavily on computer-aided design tools for logic, layout design, and simulation. *(Fall) (Evenings)*

MEMORANDUM

TO: Dean Robert Johnson

William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: November 3, 2004

RE: Request to establish (5) new EMGT courses: EMGT 6910, EMGT 6912, EMGT 6915, EMGT 6920,

EMGT 6930; and revise one existing course: EMGT 6142.

The request to establish (5) new EMGT courses: EMGT 6910, EMGT 6912, EMGT 6915, EMGT 6920, EMGT 6930; and revise one existing course: EMGT 6142 was approved by the Graduate Council on September 27, 2004 and the Faculty Council on the October 15, 2004 Consent Calendar, for immediate implementation.

Catalog Copy:

EMGT 6142. Quality and Manufacturing Management. (3) Prerequisite: Consent of Instructor. Provides an in-depth study of current issues and advances in quality manufacturing management. Topics include quality concepts, total quality management, statistical process control, continuous improvement, flexible manufacturing systems, technology evaluation and selection, and manufacturing strategy. The course covers various types of control charts, the most commonly used quality control techniques. Introduction to design of experiments, quality function deployment, and additional quality tools are also discussed. (On demand)

Course Descriptions for Proposed New Courses:

EMGT 6910. Technological Decision-Making. (3)

Prerequisite: Consent of Instructor. This course covers several techniques for engineering product design, development and improvement. A variety of decision making techniques such as several forecasting methods and quality function deployment are discussed specifically in the context of systems engineering applications, based on engineering design philosophy of cross-functional cooperation in order to create high quality products. Students will learn how to

use these techniques for making effective engineering decisions in a technological environment. (On demand)

EMGT 6912. Techniques and Intelligent Tools for Engineering Decision Support.

(3) Prerequisite: Consent of Instructor. This course surveys and introduces techniques and automated tools to support complex engineering decision-making, as well as methods for evaluating and selecting appropriate tools. During the course we will review and introduce decision-making processes and techniques; traditional automated decision support tools such as CAD, FEA, CFD, and other conventional modeling and simulation tools; decision support tools based on soft-computing technologies such as knowledge based expert systems, fuzzy logic, artificial neural nets, and genetic algorithms; and methods to evaluate and select tools appropriate for specific applications. Students will be introduced to an overview of the underlying technologies used in the tools, learn the characteristics of applications appropriate for the tools, learn how to evaluate and select the decision support tools appropriate for an application, and demonstrate their understanding by preparing examples in applications. (On demand)

EMGT 6915 Engineering Decision Analysis. (3) Prerequisites: Integral and Differential Calculus, Statistics, Probability or Consent of Instructor. This course aims to provide some useful tools for analyzing difficult decisions and making the right choice. After introducing components and challenges of decision making, the course will proceed with the discussion of structuring decisions using decision trees and influence diagrams. Decision making under uncertainty will be emphasized including maximax, maximin, and minimax regret techniques. Modeling of different risk attitudes based on risk and return tradeoffs will be analyzed through utility theory. Finally, decisions under conflicting objectives and multiple criteria will be discussed along with some

introduction to game theory. (On demand)

EMGT 6920. Logistics Engineering and Management. (3) Prerequisite: Consent of Instructor. This course introduces logistics systems from a systems engineering perspective. It starts from the design of effective and efficient systems with their respective maintenance and support infrastructures to the coordination of the production and distribution of systems and products for customer use at different stages of a final product's life cycle. The emphasis is on the design and implementation of effective and efficient logistics systems and supply chains. The course contents also include the current management issues in logistics systems implementation and supply chain operations. (On demand)

EMGT 6930. Capital Cost Estimating. (3) Prerequisite: Consent of Instructor. Provides in-depth study of cost management issues in a technological business environment. It covers cost concepts including project evaluation techniques based on cost, capital planning and budgeting, investment evaluation under risk and uncertainty, rate of return methods, estimating for economic analyses, inflation effects, depreciation and income taxes, and capital investment decision analysis. Private and public sector cost

issues are also discussed. The tools and techniques presented are useful for engineering,

business, or management professionals of any organization. Students will learn how to use the course material for effective project management, budgeting, and decision making. (On demand)

MEMORANDUM

TO: Dean Schley Lyons

College of Arts and Sciences

Dean Robert Johnson

William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: October 27, 2004

RE: Request to establish course numbers for the INES Ph.D.

The request to establish course numbers for the INES Ph.D. was approved by the chair of the Graduate Council on October 22, 2004 for immediate implementation.

Catalog copy:

INES 8090. Special Topics. (1-6)
Directed study of current topics of special interest. May be repeated for credit.

INES 8890. Doctoral Independent Study and Project. (1-9)
Individual investigation and exposition of results. May be repeated for credit.

INES 8999. Doctoral Dissertation Research. (1-9)
Each student will initiate and conduct an individual investigation culminating in the preparation and presentation of a doctoral dissertation.

INES 9999. Doctoral Residence. (1)
Meets Graduate School requirement for continuous enrollment during final term prior to graduation when all course work has been completed.

MEMORANDUM

TO: Dean Robert Johnson

William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: October 27, 2004

RE: Request to establish ETME 3244: Applied Heat Transfer

The request to establish ETME 3244: Applied Heat Transfer was approved by the chair of the Undergraduate Course and Curriculum Committee on October 25, 2004 for immediate implementation.

MEMORANDUM

TO: Dean Robert Johnson

William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: October 11, 2004

RE: Request to revise Pre-requisite changes for Mechanical Engineering & Engineering Science curriculum

The request to revise Pre-requisite changes for ME & ES curriculum was approved by the chair of the Undergraduate Course and Curriculum Committee on October 5, 2004 for immediate implementation.

Catalog copy (Changes in blue):

1. Remove Dynamics I (MEGR 3121) as a co-requisite and Change Differential Equations (MATH 2171) from pre-requisite to co-requisite for Thermo I (MEGR 3111)

MEGR 3111. Thermodynamics I. (3)
Co-requisite: MATH 2171. First and second laws of thermodynamics. Work and heat carnot cycle. Ideal and real gasses. Nonreactive mixture of gases. Availability and irreversibility.

2. Add Solids (MEGR 2144) as a prerequisite for Materials (MEGR 3161)

MEGR 3161. Introduction to Engineering Materials. (3)
Prerequisites: CHEM 1251 and MATH 2171, and MEGR 2144 with a grade of C or better. Classifications of engineering materials. Introduction to property structure relationships. Ideal and defect atomic structures of solids with examples from metals, ceramics and polymers. Cold working and annealing effects. Phase equilibria in alloys; introduction to diffusional processes and transformation kinetics.

3. Add MEGR 2144 and ECGR 2161 as prerequisites for Design Lab II (MEGR 3156)

MEGR 3156. Design Projects Lab II. (2)
Prerequisite: MEGR 2144, ECGR 2161, and MEGR 2156 all with a grade of C or better. Study of the process of design and reduction to practice of engineering concepts in a team environment. Requirements definition, concept synthesis, concept of evaluation, project planning and execution.

4. Change Calc II (MATH 1242) from a co-requisite to a prerequisite for Statics (MEGR 2141)

MEGR 2141. Engineering Mechanics I. (3)

Prerequisites: PHYS 2101 and MATH 1242. This course introduces the principles of particle and rigid body mechanics with engineering applications. Force systems and resultants. The equilibrium of particles and rigid bodies. Friction. Properties of areas and volumes.

5. Add Calc I (MATH 1241) as a prerequisite for ENGR 1202.

ENGR 1202. Introduction to Engineering Practice and Principles II. (2)

Prerequisites: ENGR 1201 and MATH 1241. A continuation of ENGR 1201 with separate applications in the disciplines of Civil, Electrical, and Mechanical Engineering involving individual and team assignments, including interdisciplinary classroom sessions on critical thinking, creative problem solving, project planning, effective technical presentations, and teamwork; and disciplinary team projects. *(Fall, Spring, Summer) (Evenings)*

MEMORANDUM

TO: Dean Robert Johnson, William States Lee College of Engineering

FROM: Cathy Sanders, Director of Assessment and Faculty Governance

DATE: May 25, 2004

RE: Request to change title, prerequisite, and course description for ECGR 6185/8185 - Advanced Embedded Systems Design was approved by the chair of the Graduate Council on February 20, 2004, for immediate implementation.

New Catalog Copy:

ECGR 6185/8185. Advanced Embedded Systems Design. (3) Prerequisite: ECGR 4101/5101. An advanced course in embedded system design utilizing 16-bit microprocessors. Architecture, software, and interface techniques. This course is project-oriented, involving the use of a logic analyzer and hardware design tools. *(Spring) (Evenings)*

MEMORANDUM

TO: Dean Schley Lyons, College of Arts and Sciences

Dean Claude Lilly, The Belk College of Business Administration

Dean Robert Johnson, The William States Lee College of Engineering

Dean Mirsad Hadzikadic, College of Information Technology

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: May 1, 2004

RE: Request to revise the name and course descriptions of 15 undergraduate courses entitled “Cooperative Education” (ACCT 3500, ARSC 3500, BIOL 3500, CHEM 3500,

ECON 3500, ENGR 3590, ESCI 3500, FINN 3500, GEOG 3500, INFO 3500. MATH 3551,

MGMT 3500, MKTG 3500, OPER 3500, PHYS 3590)

The request to revise the name and course descriptions of 15 undergraduate courses entitled "Cooperative Education" was approved by the chair of the Undergraduate Course and Curriculum Committee on April 8, 2004 for immediate implementation.

New catalog copy (changes in blue)

ACCT 3500. Cooperative Education or 49ership Experience. (0)

Prerequisite: Accounting major with Department approval, in conjunction with the University Career Center. Enrollment is required for

students participating in a cooperative education or 49ership position during each semester they are working in a position. Participating students pay a registration fee for transcript notation (co-op and 49ership) and receive full-time student status (co-op only). Assignments

must be arranged and approved in advance. Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For information, contact

the University Career Center. *(Fall, Spring, Summer)*

ARSC 3500. Cooperative Education or 49ership Experience. (0)

Prerequisites: Departmental GPA and credit hours required and approval by the departmental Co-op Coordinator in conjunction with the University Career Center. Enrollment in this course is required for Arts and Sciences students involved in professional work experiences offered through either the 49ership program, or the parallel co-op (part-time work) or the alternating co-op (full-time work) option of the cooperative education program. Participating students pay a registration fee for transcript notation (49ership and co-op) and receive

full-time student status (co-op only). Assignments must be arranged and approved in advance. Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For information, contact the University Career Center. *(Fall, Spring, Summer)*

BIOL 3500. Biology Cooperative Education or 49ership Experience. (0)

Prerequisite: approval by the Department and the University Career Center. Required of students participating in the

49ership or Cooperative Education Program during the semesters in which they are working. Participating students pay a registration

fee for transcript notation (49ership and coop) and receive full-time student status (co-op only). Assignments must be arranged and

approved in advance. Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For more information, contact the University

Career Center. *(Fall,Spring)*

CHEM 3500. Chemistry Cooperative Education or 49ership Experience.(0)

Prerequisites: Junior standing, chemistry through 2132 and acceptance into the Experiential Learning Program by the University Career

Center. Enrollment in this course is required for chemistry majors during each semester or summer when they are working on a co-op or 49ership assignment. Participating students pay a registration fee for transcript notation (49ership and co-op) and receive full-time

student status (co-op only). Assignments must be arranged and approved in advance. Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For more information, contact the University Career Center. (*On demand*)

ECON 3500. Cooperative Education or 49ership Experience. (0)

Enrollment in this course is required for the Department's Cooperative Education and 49ership students during each semester they are

working in position. Restricted to majors in the Department of Economics. Participating students pay a registration fee for transcript

notation (49ership and co-op) and receive full-time student status (co-op only). Assignments must be arranged and approved in

advance. Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For more information, contact the University Career

Center. (*Fall, Spring, Summer)*

ENGR 3590. Engineering Cooperative Education or 49ership Experience.

(0) This course is required of Co-op and 49ership students during the semester they are working. Acceptance into the Experiential

Learning Program by the University Career Center is required. Participating students pay a registration fee for transcript notation

(49ership and co-op) and receive full-time student status (co-op only). Assignments must be arranged and approved in advance.

Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For more information, contact the University Career Center.

(*Fall, Spring, Summer)*

ESCI 3500. Earth Sciences Cooperative Education or 49ership Experience. (0)

Enrollment in this course is required for the Department's earth sciences cooperative education and 49ership students during each

semester that they are working. Acceptance into the Experiential Learning Program by the University Career Center is required.

Participating students pay a registration fee for transcript notation (49ership and co-op) and receive full-time student status

(co-op only). Assignments must be arranged and approved in advance. Course may be repeated; evaluation is Satisfactory/

Unsatisfactory. For more information, contact the University Career Center. (*Fall, Spring, Summer*)

FINN 3500. Cooperative Education or 49ership Experience. (0)

Enrollment in this course is for the University cooperative education and 49ership students during each semester they are working

in a position. Acceptance into the Experiential Learning Program by the University Career Center is required. Participating students

pay a registration fee for transcript notation (49ership and co-op) and receive full-time student status (co-op only). Assignments

must be arranged and approved in advance. Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For more

information, contact the University Career Center. (*Fall, Spring, Summer*)

GEOG 3500. Geography Cooperative Education or 49ership Experience.

(0) Enrollment in this course is required for the Department's geography cooperative education and 49ership students during each

semester that they are working. Acceptance into the Experiential Learning Program by the University Career Center is required.

Participating students pay a registration fee for transcript notation (49ership and co-op) and receive full-time student status

(co-op only). Assignments must be arranged and approved in advance. Course may be repeated; evaluation is Satisfactory/

Unsatisfactory. For more information, contact the University Career Center. *(Fall, Spring, Summer*)

INFO 3500. Cooperative Education or 49ership Experience. (0)

Enrollment in this course is required for the Department's cooperative education and 49ership students during any semester they

are working in a position.. Acceptance into the Experiential Learning Program by the University Career Center is required.

Participating students pay a registration fee for transcript notation (49ership and co-op) and receive full-time student status

(co-op only). Assignments must be arranged and approved in advance. Course may be repeated; evaluation is Satisfactory/

Unsatisfactory. For more information, contact the University Career Center. (*Spring, Summer, Fall*)

MATH 3551. Mathematics Cooperative Education or 49ership Experience. (0)

Prerequisites: Sophomore standing, a 3.0 GPA in MATH/STAT/OPRS courses and consent of the Department of Mathematics.

Acceptance into the Experiential Learning Program by the University Career Center is required. The student will be employed in

a manner that affords him/her the opportunity of using and enhancing mathematical knowledge and skills through practical

experience of co-op rotation or 49ership experience. Participating students pay a registration fee for transcript notation

(49ership and co-op) and receive full-time student status (co-op only). Assignments must be arranged and approved in advance.

Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For more information, contact the University Career Center.

After completing MATH 3551, the co-op student must take MATH 3652. MATH 3551 may be repeated with consent of the

Department. Evaluation is Satisfactory/Unsatisfactory. *(On demand*)

MGMT 3500. Cooperative Education or 49ership Experience. (0)

Enrollment in this course is required for the Department's cooperative education and 49ership students during each semester

they are working in a position. This course is restricted to majors in the Department of Management. Acceptance into the

Experiential Learning Program by the University Career Center is required. Participating students pay a registration fee for

transcript notation (49ership and co-op) and receive full-time student status (co-op only). Assignments must be arranged and

approved in advance. Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For more information, contact the

University Career Center. (*Fall, Spring, Summer*)

MKTG 3500. Cooperative Education and 49ership Experience. (0)

Enrollment in this course is required for the department's cooperative education and 49ership students during each semester they

are working in a position. This course is restricted to majors in the Department of Marketing. Acceptance into the Experiential

Learning Program by the University Career Center is required. Participating students pay a registration fee for transcript notation

(49ership and co-op) and receive full-time student status (co-op only). Assignments must be arranged and approved in advance.

Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For more information, contact the University Career Center.

(*Fall, Spring, Summer*)

OPER 3500. Cooperative Education or 49ership Experience. (0)

Prerequisite: major in Management Information Systems or Operations Management. Enrollment in this course is required for the

Department's cooperative education and 49ership students during each semester they are working in a position. Acceptance into the Experiential Learning Program by the University Career Center is required. Participating students pay a registration fee for transcript

notation (49ership and co-op) and receive full-time student status (co-op only). Assignments must be arranged and approved in

advance. Course may be repeated; evaluation is Satisfactory/Unsatisfactory. For more information, contact the University Career

Center. (*Fall, Spring, Summer*)

PHYS 3590. Physics Cooperative Education or 49ership Experience. (0)

Prerequisites: junior standing and consent of Department. Registration in PHYS 3590 is required of students during each of the

semesters they are working. Acceptance into the Experiential Learning Program by the University Career Center is required.

Participating students pay a registration fee for transcript notation (49ership and co-op) and receive full-time student status

(co-op only). Assignments must be arranged and approved in advance. Course may be repeated; evaluation is Satisfactory/

Unsatisfactory. For more information, contact the University Career Center. (*Fall, Spring, Summer*)

FINANCIAL AID PROGRAMS (p22)

Part-Time Employment Off-Campus.

The University Career Center's Job Location and Development (JLD) Program assists students in obtaining part-time, summer

and temporary employment off-campus. Job listings may be viewed online to registered students in *Campus Professional*. Jobs

may include career-related positions in various fields such as education, business, entertainment, engineering and healthcare.

The JLD Program is available to help students earn money for their academic and personal expenses during their enrollment at the

University. Students are encouraged also to participate in career related experiences such as co-op, internships, and 49erships,

which can be arranged through the University Career Center's Experiential Learning Program.

College of Arts and Science

Experiential Learning Opportunities. (p46)

Students are encouraged to participate in professional work experiences in support of their academic and career development

through the cooperative education, 49ership, and internship programs offered to students in the College. The College is working

with the University Career Center to expand experiential learning offerings to enable more students to graduate with career related

experience. For more information about experiential learning programs, contact the University Career Center.

Cooperative Education involves professionally related, paid work experiences in multiple semesters. It does not offer academic

credit, but it is noted on the student's transcript. To participate in this program, students must have a minimum GPA of at least

2.5, meet specific departmental requirements, and pay a participation fee. Approval for enrollment must be arranged before the

student begins the work experience. Most students begin this program during their junior year; transfer students must complete

one semester at UNC Charlotte before making application for the program. Students maintain full-time student status during their

co-op work semesters.

Internships usually involve one semester of a professional experience that allows a student to test his or her career options.

Academic requirements for participation vary by department. Typically, a GPA of at least 2.5 is required. With faculty approval,

students may receive academic credit for their work experience; non-credit internships are available through the University Career

Center. All internships must be arranged in advance.

49erships involve paid or unpaid work in a career-related position for professional experience. A minimum of 80 work hours for

one semester is required to complete the program. Fall and Spring 49erships are part-time. Summer 49erships may be full or part-time.

Full-time students who are in good University standing, have completed their freshman year, and have a 2.0 minimum cumulative

GPA are eligible. It does not offer academic credit, but it is noted on the student's transcript; students pay a participation fee.

Approval for enrollment must be arranged before the student begins the work experience. Students may begin this program during

their sophomore year; transfer students must complete one semester at UNC Charlotte before making application for the program.

For more information, contact the University Career Center.

Service Learning Opportunities through the University Career Center

Service Learning opportunities include 49erships in non-profit and government agencies and organizations, enabling students to

gain career related and community service experience while learning about related social, civic, human service, and political issues. Students work a minimum of 80 hours per semester to complete the program. Fall and spring 49erships are part-time, and summer 49erships may be full or part-time. Students must qualify academically, and pay a registration fee for transcript notation. Employers

(as well as career advisors) assist students in working toward learning objectives and will complete an evaluation on each student

at the end of each term. Students receive transcript notation, but not academic credit.

COOPERATIVE EDUCATION PROGRAM (p 54)

Students majoring in Biology may obtain practical work experience while pursuing their degrees. The cooperative Education Program

allows qualified students either to alternate semesters of academic study with semesters of work experience or to combine academic

study and work during the same semester. The work experience is arranged by the University Career Center and must be approved by

the Department of Biology. Placements are based on a student's academic interests and on the availability of appropriate positions and

are carried out under the supervision of a Biology faculty member who serves as co-op advisor. Work semesters are followed by

participation in the Biology Cooperative Education Seminar.

COOPERATIVE EDUCATION EXPERIENCE (p 60)

Students majoring in Chemistry may obtain practical work experience in chemistry before graduation by participating in the Chemistry Cooperative Education Experience any time after the completion of sophomore year and CHEM 2132. A minimum GPA of 2.5 overall

and 2.5 in chemistry is required. At least two semesters of work assignments must be completed concurrent with enrollment in

CHEM 3500. Advisors will assist students to design a schedule that accommodates both work assignments and the upper division

chemistry courses which are normally offered on alternate semesters. Experiences are arranged in coordination with the University

Career Center.

Cooperative Education in Geography and Earth Sciences. (p 70)

Students in the Geography and Earth Sciences programs may obtain practical work experience while pursuing their degrees by

participating in the Cooperative Education program. The work experience is approved by the Department and is closely related to the

student's field of study. Students interested in learning more about participating in this program should contact the Department of

Geography and Earth Sciences or the University Career Center.

COOPERATIVE EDUCATION PROGRAM (p 80)

A student may participate in the Mathematics Cooperative Education Program in either the parallel or alternate track. The parallel track combines academic study and cooperative experience during the same semester, while the alternate track alternates semesters totally

devoted to work with semesters totally devoted to academic study. Students in the Mathematics Cooperative Education Program must participate in a minimum of two semesters in the program. Students interested in participating in the program should contact the

Coordinator of Undergraduate Programs in the Department of Mathematics for information or the University Career Center.

COOPERATIVE EDUCATION PROGRAM (p 85)

Students majoring in Physics have an opportunity to combine work experience with their academic experience. The Cooperative

Education Program is a plan whereby a student completes his/her lower-division coursework and, after being formally accepted as a

co-op student, alternates periods of academic coursework with periods of paid employment in an area mutually agreed upon by the

student, an employer, and the University. This program enables the student to integrate classroom instruction with practical on-the-job experience with business, industry, government agencies, or other employers. A student electing this option should expect to graduate

in five years, instead of the four years normally required. Further information regarding Cooperative Education can be found elsewhere

in this *Catalog*. Information regarding the application procedure for admission into this program can be obtained from the Physics and

Optical Science Department or the University Career Center.

College of Business Administration

Experiential Learning Opportunities. (p 93)

Students are encouraged to participate in professional work experiences that support academic and career development. The College

is working with the University Career Center to expand experiential learning offerings to enable more students to graduate with career-

related experience. The program consists of 49ership opportunities and Cooperative Education.

Cooperative Education involves professionally related, paid work experiences in multiple semesters. It does not offer academic credit,

but it is noted on the student's transcript. To participate in this program, students must have a GPA of at least 2.5, meet specific

departmental requirements, and pay a participation fee. Approval for enrollment must be arranged before the student begins the work experience. Most students begin this program during their junior year; transfer students must complete one semester at UNC Charlotte

before making application for the program. Students maintain full-time student status during their co-op work semesters. For further information, and to explore other credit and non-credit experiential earning opportunities including internships, contact the major

Department Chairperson or the University Career Center.

49erships involve paid or unpaid work in a career-related position for professional experience. A minimum of 80 work hours for one

semester is required to complete the program. Fall and Spring 49erships are part-time. Summer 49erships may be full or part-time. Full-time students who are in good University standing, have completed their freshman year, and have a 2.0 minimum cumulative GPA are eligible.

It does not offer academic credit, but it is noted on the student's transcript; students pay a participation fee. Approval for enrollment

must be arranged before the student begins the work experience. Students may begin this program during their sophomore year; transfer students must complete one semester at UNC Charlotte before making application for the program. For more information, contact the

University Career Center.

Service Learning Opportunities through the University Career Center

Service Learning opportunities include 49erships in non-profit and government agencies and organizations, enabling students to gain career related and community service experience while learning about related social, civic, human service, and political issues. Students work a minimum of 80 hours per semester to complete the program. Fall and spring 49erships are part-time, and summer 49erships

may be full or part-time. Students must qualify academically, and pay a registration fee for transcript notation. Employers (as well as

career advisors) assist students in working toward learning objectives and will complete an evaluation on each student at the end of each term. Students receive transcript notation, but not academic credit.

Cooperative Education Program. (p 95)

Students in the Department of Accounting may obtain practical work experience related to their major by participating in the Cooperative Education Program. The work experience arranged in coordination with the University Career Center must be closely related to the study

of accounting and must be approved by the Co-op Advisor in the Accounting Department. To be eligible for cooperative education,

students must be juniors who have an overall GPA of at least 2.5 and have completed the progression courses required by The Belk

College of Business Administration. Transfer students must complete at least 12 hours at UNC Charlotte to be eligible for cooperative education. Completion of courses related to the co-op position may be required prior to the co-op work experience. These courses will be established by the Co-op Advisor. Students must complete either two full-time alternating semesters of work or three consecutive part-time work semesters while taking a reduced academic load of no more than nine credit hours. Students selected to work in a public accounting

firm or for an internal audit position may complete program requirements by working one semester and either writing a paper or making a

formal presentation before faculty and students.

Cooperative Education Program. (p 96)

Management Information Systems and Industrial/Operations Management majors may obtain practical work experience related to their

major by participating in the cooperative education program. To be eligible for cooperative education, students must be juniors who have

an overall GPA of at least 2.5 and have completed the progression courses required by The Belk College of Business Administration.

Transfer students must complete at least 12 hours at UNC Charlotte to be eligible for cooperative education. Completion of courses related

to the co-op position may be required prior to the co-op work experience. These courses will be established by the Co-op Advisor. Students must complete either two full-time alternating semesters of work or three consecutive part-time work semesters while taking a reduced

academic load of no more than nine credit hours. Participation must be approved in advance. Contact the University Career Center for

more information.

Cooperative Education Program. Management Students majoring in Management Information Systems are strongly encouraged to

participate in the University cooperative education program, which provides substantial educational and employment opportunities. Furthermore, many companies hire only students who have participated in the cooperative education program. To be eligible for

cooperative education, students must be juniors who have an overall GPA of at least 2.5 and have completed the progression courses

required by The Belk College of Business Administration. Transfer students must complete at least 12 hours at UNC Charlotte to be eligible

for cooperative education. Completion of courses related to the co-op position may be required prior to the co-op work experience. These courses will be established by the Co-op Advisor. Students must complete either two full-time alternating semesters of work or three consecutive part-time work semesters while taking a reduced academic load of no more than nine credit hours. Participation must be

approved in advance. Contact the University Career Center for more information.

Cooperative Education Program. (p 99)

Economics majors may obtain practical work experience related to their major by participating in the cooperative education program. To

be eligible for cooperative education, students must be juniors who have an overall GPA of at least 2.5 and have completed the eight progression courses required by the Department of Economics. Transfer students must complete at least 12 hours at UNC Charlotte to be eligible for cooperative education. Completion of courses related to the co-op position may be required prior to the co-op work experience. These courses will be established by the Co-op Advisor and must be approved in advance. Contact the University Career Center for more information.

Cooperative Education Program. (p 102)

Management majors may obtain practical work experience related to their major by participating in the cooperative education program. To

be eligible for cooperative education, students must be juniors who have an overall GPA of at least 2.5 and have completed the progression courses required by The Belk College of Business Administration. Transfer students must complete at least 12 hours at UNC Charlotte to be eligible for cooperative education. Completion of courses related to the co-op position may be required prior to the co-op work experience. These courses will be established by the Co-op Advisor in the University Career Center. Students must complete either two full-time

alternating semesters of work or three consecutive part-time work semesters while taking a reduced academic load of no more than nine

credit hours. Experiences are arranged in coordination with the University Career Center.

Cooperative Education Program. (p 104)

Marketing majors may obtain practical work experience related to their major by participating in the cooperative education program. To be eligible for cooperative education, students must be juniors who have an overall GPA of at least 2.5 and have completed the progression courses required by The Belk College of Business Administration. Transfer students must complete at least 12 hours at UNC Charlotte to

be eligible for cooperative education. Completion of courses related to the co-op position may be required prior to the co-op work

experience. These courses will be established by the Co-op Advisor. Students must complete either two full-time alternating semesters

of work or three consecutive part-time work semesters while taking a reduced academic load of no more than nine credit hours. The

Department of Marketing coordinates the co-op experience with the University Career Center.

College of Engineering

Cooperative Education (Co-op) Program. (p 118)

Students in The William States Lee College of Engineering may obtain practical work experience while pursuing their degree by participating

in cooperative education whereby a student alternates semesters of full-time academic study with semesters of full-time work experience in industry. The work experience is under the direction of the student's major department and is closely related to his or her field of study. Civil engineering, computer engineering, electrical engineering, and mechanical engineering students who fulfill all requirements of the co-op program can earn up to three credit hours for a technical elective and will receive partial credit toward the professional practice requirement

for registration as a Professional Engineer. To be eligible for the Co-op program, an engineering student must have completed at least 24

credit hours at UNC Charlotte including a number of specified courses with a minimum GPA of 2.5. A transfer student is expected to have completed at least 12 hours at UNC Charlotte. An engineering technology student must have earned an Associate of Applied Science degree with a GPA of 2.5 or better (out of 4.0) and completed at least 12 hours at UNC Charlotte. For an undergraduate to be officially designated as

a Co-op student, he or she must participate in at least three semesters of work experience (three work sessions and three seminar courses). Consequently, participation in Co-op Education usually means that the student will take five years to complete the engineering program or three years (at UNC Charlotte) to complete the engineering technology program. Students interested in learning more about the advantages and opportunities of participating in this program should contact the College's Faculty Associate for Student Professional Development or

the University Career Center.

Domestic Internships. A number of opportunities for non-credit internships, called 49erships, exist for students in the College. Engineering internships are almost always paid positions. A minimum of 80 work hours for one semester is required to complete the program. Fall and Spring 49erships are part-time. Summer 49erships may be full or part-time. Full-time students who are in good University standing, have completed their freshman year, and have a 2.0 minimum cumulative GPA are eligible. It does not offer academic credit, but it is noted on the student's transcript; students pay a participation fee. Approval for enrollment must be arranged before the student begins the work

experience. Students may begin this program during their sophomore year; transfer students must complete one semester at UNC Charlotte before making application for the program. Students interested in learning more about these opportunities should consult with their advisor, the College's Faculty Associate for Student Professional Development or the University Career Center. ~~Information, contact the Office of Continuing Education, Extension, and Summer Programs.~~

Experiential Learning Requirements. (p 126)

All students graduating after August 1999 must complete at least one experiential course. Experiential courses are practice oriented courses such as cooperative education, internships, senior design projects, or undergraduate research.

College of Information Technology (p 140)

Cooperative Education Program. Students in the College of Information Technology may obtain practical work experience while pursuing

their degree by participating in cooperative education, whereby a student alternates semesters of academic study with semesters of work experience in industry. The work experience is under the direction of the student's department and is closely related to his or her field of

study. To be eligible for the Co-op program, students in the College of Information Technology must have completed at least 24 credit hours

at UNC Charlotte, including a number of specified courses, with a minimum GPA of 2.50. A transfer student is expected to have completed 12 hours at UNC Charlotte, with those same specified courses. For an undergraduate to be officially designated as a Co-op student, he or she must participate in at least two semesters of work experience. Consequently, participation in Co-op Education may mean that the student

will take five years to complete the programs at UNC Charlotte. Students interested in learning more about the advantages and opportunities

of participating in this program should contact the University Career Center.

Internships. A number of opportunities for internships exist for students in the College. These internships may be with or without pay

and with or without academic credit. Students interested in learning more about these opportunities should consult with their advisor and

with the College of Information Technology program coordinator in the University Career Center.

Cooperative Education in Computer Science. By participating in the Cooperative Education program, students in computer science may

pursue their education along with alternating work experiences so that they may be better prepared to enter their chosen professional career. Interested students should contact the *University Career Center* for more information.

Cooperative Education in Software and Information Systems. (p 142)

By participating in the Cooperative Education program, students in the department may pursue their education along with alternating work experiences so that they may be better prepared to enter their chosen professional career. Interested students should contact the University Career Center for more information.

Special Program (p 146)

Experiential Learning Programs

The majority of UNC Charlotte students are expected to and do participate in University-sanctioned experiential learning programs

(over 60%). Opportunities are available for both undergraduate and graduate students to receive course credit, transcript notation, or other recognition for supervised experiences in public and private agencies within the community, nationally, and internationally. These opportunities are offered through experiential learning programs including over 330 courses involving clinicals, cooperative education, internships, 49erships, and practical. The University Career Center coordinates most experiential learning opportunities for the campus

and can provide information about the following options:

Cooperative Education: This career related professional program is available to students in the Colleges of Arts and Sciences, Business Administration, Information Technology, and Engineering. Participants must have a GPA of at least 2.5 and complete course requirements specified by their department. Transfer students must complete 12 hours at UNC Charlotte before applying to the program. Co-op students work two to three semesters either part-time or fulltime (depending on college requirements) with an employer in a paid work experience. Although the experience does not offer academic credit, participants are classified as full-time students and receive transcript notation.

Internships: Internship programs provide an introduction to career options in a professionally related work experience which enables the student to apply classroom learning. This experience is usually unpaid and may offer academic credit if there is appropriate faculty

supervision. Students work 8 to 12 hours a week while also taking classes.

The 49ership Program: The University Career Center sponsors a non-credit internship called a 49ership. Program participation is especially valuable for students who want career experience and do not have an internship option through their academic major. Students may

participate in the program after their freshman year provided they have a GPA of 2.0 or better; graduate students must complete 9 credit

hours in their graduate program before making application. (Transfer students must successfully complete 12 credit hours at UNC Charlotte before making application.) . A minimum of 80 work hours for one semester is required to complete the program. Fall and Spring 49erships

are part-time. Summer 49erships may be full or part-time. Full-time students who are in good University standing, have completed their

freshman year, and have a 2.0 minimum cumulative GPA are eligible. It does not offer academic credit, but it is noted on the student's transcript; students pay a registration fee. Approval for enrollment must be arranged before the student begins the work experience. Participating employers have included Carolinas Medical Center, the District Attorney's Office, General Electric, Walt Disney World,

Duke Energy, Vanguard, Transamerica, and US Airways. Seventy percent (70%) of the positions in this program are compensated.

Service Learning Opportunities through the University Career Center

Service Learning opportunities include 49erships in non-profit and government agencies and organizations, enabling students to gain career related and community service experience while learning about related social, civic, human service, and political issues. Students work a minimum of 80 hours per semester to complete the program. Fall and spring 49erships are part-time, and summer 49erships

may be full or part-time. Students must qualify academically, and pay a registration fee for transcript notation. Employers (as well as

career advisors) assist students in working toward learning objectives and will complete an evaluation on each student at the end of each term. Students receive transcript notation, but not academic credit.

The Career Prospector Program: This program involves "shadowing" professionals in various career fields. Students are able to explore career options and academic interests by conducting informational interviews and observing professionals in the career fields of their

choice. The shadowing experiences can last for one day or longer, depending on the schedules of the students and sponsors. Over **300** sponsors in various career fields participate in this program coordinated through the University Career Center.

cc: Dr. Rick Lejk, Chair, Undergraduate Course & Curriculum Comm.
Ms. Denise Dwight Smith, Director, University Career Center

Dr. Bill Hill, Assoc. Dean, College of Arts & Sciences

Dr. Hughlene Burton, Accounting Dept.

Dr. Mark Clemens, Biology Dept.

Dr. Bernadette Donovan-Merkert, Chemistry Dept.

Dr. John Gandar, Economics Dept.

Dr. Ronald Smelser, Assoc. Dean, College of Engineering

Dr. Gerald Ingalls, Geography & Earth Sciences Dept.

Dr. Calvin W. Sealey, Jr., Finance Dept.

Dr. Moutaz Khouja, Bus. Info. Systems & Operations Management

Dr. Alan Dow, Math Dept.

Dr. Ben Tepper, Management Dept.

Dr. Linda Swayne, Maketing Dept.

Dr. Faramarz Farahi, Physics Dept.

Ms. Stephanie Hodgin, President, Student Government Association

Mr. Richard Yount, Registrar

Mr. Craig Fulton, Director, Admissions

Ms. Peggy Gordon, Undergraduate Catalog

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: June 4, 2004

RE: Request to establish ETEE 3230, Electronic Communications; ETEE 3240, Fiber Optics Systems; and ETEE 3260, Opto-Electronic Communications Laboratory

The request to establish ETEE 3230, Electronic Communications; ETEE 3240, Fiber Optics Systems; and ETEE 3260, Opto-Electronic Communications Laboratory was approved by the chair of the Undergraduate Course and Curriculum Committee on June 2, 2004 for immediate implementation.

New catalog copy

ETEE 3230. Electronic Communications. (3)

Prerequisites or co-requisites: Senior status in ET or permission of department. This course covers basic principles and concepts of modern communication systems. Topics include systems, signals, modulations, transmission, reception and networks. *(On demand)*

ETEE 3240. Fiber Optics Systems. (3)

Prerequisites or co-requisites: Senior status in ET or permission of department. Introduction to optical fiber communications systems. Review of ray and wave optics. Fundamentals of amplitude, frequency, and digital modulation/demodulation. Optic fiber waveguides. Light sources and detectors. Components, systems, and networks. *(On demand)*

ETEE 3260. Opto-Electronic Communications Laboratory. (1)

Prerequisites or co-requisites: ETEE 3230, ETEE 3249, senior status in ET or permission of department. Opto-electronic Communications systems measurements, instrumentation, and applications. Experiments support concepts and practice covered in ETEE 3230 and 3240. *(On demand)*

cc: Dr. Rick Lejk
Dr. Sheng-Guo Wang

Dr. Anthony Brizendine

Prof. Tom Owen
Dr. Falih Ahmad

Ms. Stephanie Hodgin

Mr. Richard Yount

Mr. Craig Fulton

Ms. Peggy Gordon

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: May 7, 2004

RE: Request to remove a directed elective from the Civil Engineering Technology's construction

emphasis curriculum and to substitute in its place existing course ETCE 3241 – Highway

Design and Construction

The request to remove a directed elective from the Civil Engineering Technology's construction

emphasis curriculum and to substitute in its place existing course ETCE 3241 – Highway Design

and Construction was approved by the chair of the Undergraduate Course and Curriculum

Committee on April 30, 2004 for immediate implementation.

New catalog copy

Remove the existing catalog copy under the Civil Engineering Technology Construction Emphasis for the Spring

Semester Senior Year (page 121) and replace with the following:

ETCE 3211 Reinforced Concrete Design..... 3

ETCE 3241 Highway Design and Construction..... 3

ETCE 3293 Mechanical & Electric Systems for Buildings..... 3

ETCE 3642 Senior Design Project (W,O)..... 2

Major Elective (*see* Note b.)..... 3

Directed Elective (*see* Note a.)..... 3

cc: Dr. Rick Lejk
Dr. Anthony Brizendine

Prof. Bruce Gehrig

Ms. Stephanie Hodgin

Mr. Richard Yount

Mr. Craig Fulton

Ms. Peggy Gordon

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: March 15, 2004

RE: Request to establish ECGR 6263/8263: Advanced Analog Integrated Circuit Design

The request to establish ECGR 6263/8263: Advanced Analog Integrated Circuit Design was approved by the Graduate Council on February 6, 2004 and the Faculty Council on the February 25, 2004 Consent Calendar for immediate implementation.

New catalog copy

ECGR 6263/8263: Advanced Analog Integrated Circuit Design (3). Prerequisites:

ECGR 4132/5132 (Analog Integrated Circuit Design), graduate standing, or permission

of department. Design of analog integrated circuits in digital CMOS processes. Advanced

topics include MOS noise, dc mismatch, design over the continuum of operation (weak,

moderate, and strong inversion), and computer simulation using the EKV MOS model.

Topics applied to the design of low-noise preamplifiers, advanced operational amplifiers,

and other CMOS circuits. *(Fall)*

cc: Dr. Rick Lejk
Dr. Farid Tranjan

Mr. Stefanos Arethas

Mr. Richard Yount

Mr. Craig Fulton

Ms. Peggy Gordon

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: March 15, 2004

RE: Request to establish ECGR 6157/8157: Data Converters

The request to establish ECGR 6157/8157: Data Converters was approved by the Graduate Council on February 6, 2004 and the Faculty Council on the February 25, 2004 Consent Calendar for immediate implementation.

New catalog copy

ECGR 6157 / 8157: Data Converters (3).

Prerequisites: ECGR 4132 / 5132 (Analog Integrated Circuit Design), graduate standing, or

permission of instructor. Design of integrated data converters. Topics include discrete time

signal, design of sample and hold circuits, comparators, switched capacitor amplifiers and

integrators, data converter performance metrics, Nyquist rate ADCs and DACs,

oversampled ADCs and DACs, design of decimation, anti-aliasing and reconstruction

filters. Topics applied to the design, simulation and layout of an ADC / DAC circuit. *(Spring)*

cc: Dr. Rick Lejk
Dr. Farid Tranjan

Mr. Stefanos Arethas

Mr. Richard Yount

Mr. Craig Fulton

Ms. Peggy Gordon

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Wayne Walcott

Senior Associate Provost

DATE: February 3, 2004

RE: Authorization to Establish the Joint Bachelor of Science program in Electrical Engineering

between the University of North Carolina at Charlotte and Western Carolina University

Authorization to establish the **Joint Bachelor of Science program in Electrical**

Engineering between the University of North Carolina at Charlotte and

Western Carolina University was given by the UNC Board of Governors on

January 9, 2004. Attached are the official notification of authorization to establish

and the course proposal.

Attachments (2)

cc:

Dr. Tom Reynolds	Ms. Kathi Baucom
Dr. Sue Bishop	Mr. Richard Yount
Dr. Mary Lynne Calhoun	Mr. Craig Fulton
Dr. Mirsad Hadzikadic	Ms. Wanda Fisher
Dr. Schley Lyons	Ms. Betty Johnson
Mr. Ken Lambla	Ms. Peggy Gordon
Dr. Claude Lilly	Ms. Deborah Clayton

Dr. Kent Curran
Dr. Farid Tranjan

Advising Team

Executive Summary

Request for Authorization to Establish

Western Carolina University – UNC Charlotte

Joint Bachelor of Science in Electrical Engineering Program

Western Carolina University (WCU) and The University of North Carolina at Charlotte (UNC Charlotte) request authorization to offer a Joint Bachelor of Science in Electrical Engineering (BSEE). UNC Charlotte's Electrical Engineering (EE) curriculum, accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET), is the curriculum for the joint program. The joint program will seek accreditation from ABET.

Administration

The Deans of the UNC Charlotte's William States Lee College Engineering and WCU's College of Applied Sciences or designees of each institutions' Chief Academic Officer will be appoint campus directors for the joint program.

The campus directors will have joint responsibility for program operation and for the accreditation process. The program faculty from UNC Charlotte will hold adjunct appointments

at WCU. Program faculty from WCU will hold adjunct rank at UNC Charlotte. A Joint Faculty Curriculum Committee (JFCC) will be formed with representation of a least three faculty from each of the two campuses.

WCU's current Department of Engineering Technology will house the WCU portion of the program. The WCU Department of Engineering Technology will seek a name change to the Department of Engineering and Technology once authorization to establish the program has been received.

Delivery

Many of the courses for the Electrical Engineering curriculum will be delivered by distance education. The program directors will ensure that qualified staff provides on-site supplemental instruction to students in distance education courses. The two universities have identified the courses that WCU is responsible for delivering to the joint program students, the courses that UNC Charlotte is responsible for delivering, and the courses that both campuses will offer.

WCU will recruit and hire qualified faculty members to teach the on-site EE courses and will use current faculty to teach required liberal studies, mathematics, and science courses. At the time that the program is established, admissions standards will be those employed by the William States Lee College of Engineering at UNC Charlotte. The primary audience of the Joint Program will be students who enroll at WCU as freshmen. Qualified first-year students

who seek to major in EE will enroll in a Freshman Engineering Program. Once students have

successfully completed Freshman Engineering, they may transfer to the EE program. Students from two-year applied science programs may also enter the program after demonstrating that they have met all necessary prerequisites.

The two institutions will develop a plan to address tuition and fees that will minimize any differential that might exist between a student enrolled full time in this joint program through a combination of WCU and UNC Charlotte courses and the cost for a student to be enrolled full time at the home institution. The student's tuition and fees will be a combination of tuition for courses at the home institution and the corresponding distance education tuition for courses taught remotely. Jointly enrolled part-time students (resident credit or distance education credit) will pay tuition and fees to the applicable institution granting the academic credit. WCU and UNC Charlotte will each report actual student credit hours delivered by their faculty to students enrolled in the joint engineering degree program.

Facilities

WCU's maintains five electrical and telecommunications engineering technology laboratories and is constructing the Center for Applied Technology, which will provide the program with new facilities.

Other new support for the program will come from a $4.7 Defense Advanced Research Projects Agency (DARPA) grant for the purchase of infrastructure and equipment. New instrumentation and computers (including engineering workstations) have been purchased that

will improve testing capabilities and provide for the integration of computer-based testing and measurement.

Two new laboratories are being created for photonics and optoelectronics using DARPA resources. Equipment is being specified that will provide for undergraduate experiences with fiber optics, optical communication, and optical sources and detectors. Additional equipment is being purchased to support research on optical transceiver transmission rates and related bit error ratio testing. The technical electives in the joint program will focus on the area of optoelectronics.

Both institutions will develop additional distance education facilities, acquire software licenses, and add full-time technical support personnel to support the distance education requirements of the program.

Library

WCU's Hunter Library has sufficient science holdings, but inadequate engineering holdings. Hunter Library has begun and will continue to purchase monograph and media collections to support this program. Students and faculty will also have access to Interlibrary Loan and UNC Charlotte Atkins Library resources.

THE UNIVERSITY OF NORTH CAROLINA

Request for Authorization to Establish a New Degree Program

INSTRUCTIONS: Please submit five copies of the proposal to the Senior Vice President for Academic Affairs, UNC Office of the President.

Each proposal should include 2-3 page executive summary. The signature of the Chancellor is required.

Date: December 17, 2003

Constituent Institution: Western Carolina University and The University of North Carolina at Charlotte

CIP Discipline Specialty Title: Electrical, Electronics, and Communications Engineering

CIP Discipline Specialty Number: 14.1001 Level: B X M __ 1stProf __ D __

Exact Title of the Proposed Degree: ____Electrical Engineering___

Exact Degree Abbreviation (e.g. B.S., B.A., M.A., M.S., Ed.D., Ph.D.): __B.S.__

Does the proposed program constitute a substantive change as defined by SACS? Yes X No __

a) Is it at a more advanced level than those previously authorized? Yes __ No _X_

b) Is the proposed program in a new discipline division? Yes X No __

Proposed date to establish degree program (allow at least 3-6 months for proposal review):

m*onth* August *year* 2004

Do you plan to offer the proposed program away from campus *during the first year of operation?*

Yes ____ No __X__ (Joint degree program partially offered through distance learning)

If so, complete the form to be used to request establishment of a distance education program and submit it along with this request.

I. Description of the Program

A. Describe the proposed degree program (i.e., its nature, scope, and intended audience).

Western Carolina University (WCU) and The University of North Carolina at Charlotte (UNC Charlotte) will offer a Joint B.S. degree in Electrical Engineering (BSEE). The degree program will follow the UNC Charlotte electrical engineering curriculum, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET). WCU and UNC Charlotte will seek accreditation from ABET for the joint program.

Since UNC Charlotte already is authorized to offer the BSEE degree and holds ABET accreditation, this document does not go into detail concerning the facilities, faculty and university requirements, etc. of that institution. Rather, the focus is on the impact of the joint program and the readiness of WCU to collaborate in the joint program.

For purposes of program administration, the Dean of Engineering at UNC Charlotte and the Dean of the College of Applied Sciences at WCU or a designee of the Chief Academic Officer at each institution will be responsible for appointing a campus director for the joint program. The directors will be responsible for the program operation and accreditation. The constituent faculties of the Joint Program at WCU and UNC Charlotte will hold adjunct rank at the collaborating institution. Program directors, in consultation with their appropriate deans, will appoint a minimum of three faculty at their respective institutions to serve as a Joint Faculty Curriculum Committee. (JFCC). The JFCC will have responsibility for recommending to the Joint Program Faculty curriculum, program objectives and outcomes, admission standards, assessment methodology, and standards for student progression and graduation. Selected EE courses will be delivered by both WCU and UNC Charlotte faculty using distance delivery systems supported by online technology to students on the two campuses. Selected EE courses will be taught on-site by WCU faculty. Remote sites will support students with on-site supplemental instruction by qualified content experts approved by the Program Directors. Each institution will support the program with qualified technical staff. Liberal studies, mathematics, and sciences courses will be taught on-site by WCU faculty using existing courses. A Memorandum of Understanding between the two universities is under development.

Admission standards to the program shall be determined by the Joint Faculty and implemented by an admissions committee at each campus. Program admission requirements will be those used by the UNC Charlotte Engineering Program at the point the program is implemented. Students admitted to the joint program will have a designated home institution, usually the institution at which general education requirements are completed. Joint program students are eligible to enroll in program courses offered at either institution and are eligible to enroll in other courses on a space available basis. The primary audience of the Joint Program will be students who enroll at WCU as freshmen. Students who wish to major in EE will be enrolled in the Freshman Engineering Program. Upon successful completion of this program and satisfaction of the progression requirements, they will be transferred to the EE program. The program will also accommodate graduates of Associate in Applied Science college transfer programs.

Students from two year Associate in Applied Science programs who wish to transfer to EE, will have to fulfill necessary prerequisites, e.g., mathematics and sciences. In order to enter the EE program, all students regardless of their previous academic background must complete successfully the Freshman Engineering Program.

The two institutions will develop a plan to address tuition and fees that will minimize any differential that might exist between a student enrolled full time in this joint program through a combination of WCU and UNC Charlotte courses and the cost for a student to be enrolled full time at the home institution. The student's tuition and fees will be a combination of tuition for courses at the home institution and the corresponding distance education tuition for courses taught remotely. Jointly enrolled part time students (resident credit or distance education credit) will pay tuition and fees to the applicable institution granting the academic credit.

Using the approved UNC CIP course codes, WCU and UNC Charlotte will each report actual student credit hours delivered by their faculty to students enrolled in the joint engineering degree program.

Four Year Course Sequence

Fall **Spring**

ENGR 191 Eng/Prac/Prin. I (2)	ENGR 192 Eng/Prac/Prin. II (2)
MATH 1zz Eng. Calc. I **(C2)** (3)	MATH 2xx Eng. Calc. II (3)
CHEM 132 Intr. Chem. **(C5)** (4)	PHY 230 Gen. Physics **(C5)** (4)
ENGL 101 Composition I **(C1)** (3)	ENGL 102 Composition II **(C1)** (3)
Social Sciences **(P1)** (3)	Social Sciences **(P1)** (3)
15	15

EE 211 Network Theory I (3)	EE 212 Network Theory II (3)
EE 200 Comp. Util. in C++ (3)	EE 222 El. Eng. Design I (2)
EE 221 Logic Sys. Design. I (3)	EE 202 Instr/Ntwks Lab (1)
EE 201 Logic/Ntwks Lab (1)	Oral Communications **(C3)** (3)
MATH 2yy Eng. Calc. III (3)	MATH 320 Ord. Diff. Equations (3)
PHY 2xx Fund. Optics/Matls (3)	PHY 310 Modern Physics (3)
16	15

EE 311 Signals/Systems (3)	EE 322 Solid State Micro (3)
EE 341 El. Eng. Design II (2)	EE 332 Electronics (3)
EE 331 Fund. El/Semicond. (3)	EE 342 E-M Waves (3)
EE 321 Intr. to E-M Fields (3)	EE 302 E-M/Devices Lab (1)

ENGR 300 Prof. Dev.	(1)	MATH 370 Prob/Statistics	(3)
EE 301 Sys/Electronics Lab	(1)	Humanities **(P4)**	(3)
Fine/Perf Arts **(P5)**	(3)		
	16		16

EE 411 Senior Design I	(2)	EE 412 Senior Design II	(3)
EE 421 Comm. Theory	(3)	Science Elective	(3)
EE 4XX Elective	(3)	EE 402 El. Eng. Prof. Prac.	(2)
Tech. Elec. ……	(3)	Tech. Elec. ……	(3)
World Cultures **(P6)**	(3)	Tech. Elec. ……	(3)
Wellness **(C4)**	(3)	History **(P3)**	(3)
	17		17

Note: Courses indicated by designations in bold such as **P6** fulfill the liberal studies component.

The course listing below identifies the courses in the EE major and how the courses will be distributed between the two institutions.

EE Major Course Responsibility

Charlotte	**WCU**	**UNC**
ENGR 191 Introduction to Engineering Practice &		

Principles I, 2 hours x

ENGR 192 Introduction to Engineering Practice &

Principles II, 2 hours x

ENGR 300 Professional Development, 1 hour x

EE 200 Computer Utilization in C++, 3 hours x

EE 201 Logic and Networks Lab, 1 hour x

EE 202 Instrumentation and Networks Lab, 1 hour x

EE 211 Network Theory I, 3 hours x

EE 212 Network Theory II, 3 hours x

EE 221 Logic System Design I, 3 hours x

EE 222 Electrical Engineering Design I, 2 hours x

EE 301 Systems and Electronics Lab, 1 hour x

EE 302 E-M and Electronic Devices Lab, 1 hour x

EE 311 Signals and Systems, 3 hours x

EE 321 Introduction to Electromagnetic Fields, 3 hours x

EE 322 Solid State Microelectronics I, 3 hours x

EE 331 Fund. of Electronics/Semiconductors, 3 hours x

EE 332 Electronics, 3 hours x

EE 341 Electrical Engineering Design II, 2 hours x

EE 342 Electromagnetic Waves, 3 hours				x
EE 402 Electrical Engineering Prof. Practice, 2 hours	x	x		
EE 411 Senior Design I, 2 hours		x	x	
EE 412 Senior Design II, 3 hours		x	x	
EE 421 Communication Theory, 3 hours				x
EE 4xx Senior Elective, 3 hours		x	x	
Technical Elective				x
Technical Elective				x
Technical Elective				x

UNC Charlotte uses a ECGR prefix for the electrical engineering courses. Parallel courses offered by WCU will carry the prefix of EE and ENGR. The course title, course description, and course outline as used by UNC Charlotte will be used in the EE program at WCU. For example, ECGR 2111 Network Theory I at UNC Charlotte is the same as EE 211 Network Theory I at WCU.

B. List the educational objectives of the program.

The Program Educational Objectives are the same as in the BSEE program at UNC Charlotte:

• Provide students the opportunity and the environment to acquire the educational background necessary to pursue professional careers in Electrical Engineering and/or to continue their education toward an advanced degree in the field.

• Provide graduates who have a comprehensive background in mathematics, physical and social sciences, liberal arts, and human values, with in-depth knowledge of the fundamentals of engineering science and Electrical Engineering that perpetuates life-long learning.

• Provide graduates with the tools to pursue successful and long careers in the profession that places ethical conduct as paramount.

• Prepare graduates who can effectively communicate their thoughts and ideas to their surroundings along with the understanding of the impact of Electrical Engineering on global, societal, and environmental issues.

• Provide graduates who have state-of-the-art computer skills suitable for a modern career in Electrical Engineering, where computer utilization is an essential tool.

C. Describe the relationship of the program to other programs currently offered at the proposing institution, including the common use of: (1) courses, (2) faculty, (3) facilities, and (4) other resources.

At WCU, the BSEE will be housed in the Department of Engineering Technology. A proposal will be forthcoming in Fall 2003 to change the name to Department of Engineering and Technology when the EE program is approved by the Board of Governors. Currently, the department offers undergraduate programs in Electrical and Computer Engineering Technology, Telecommunications Engineering Technology, Manufacturing Engineering Technology, Engineering Technology, Industrial Distribution, and Construction Management. A Master of Science degree in Technology is also offered by the Department. The ECET and MET program are TAC of ABET accredited.

With regard to the major courses in EE, qualified faculty from both WCU and UNC Charlotte will share the instruction and form a joint faculty for this program. WCU will conduct nationwide searches to secure faculty who are EAC/ABET qualified to teach the on-site EE courses. Liberal studies, mathematics, and sciences courses will be taught using existing WCU faculty and resources.

The department maintains 14 laboratories for instruction. Five of these laboratories are dedicated to electrical and telecommunications engineering technology. All are equipped with modern computers for simulation exercises. Other laboratories are used for engineering computing graphics, rapid prototyping, manufacturing automation, machining, and metrology. A new building, the Center for Applied Technology, will be available for occupancy during fall 2003, and will provide four of the 14 laboratories with approximately 15,000 square feet and two additional classrooms.

The Department received an award ($4.7 million dollars) which is being administered by the Defense Advanced Research Projects Agency (DARPA). Approximately seventy percent of this award is being allocated to the acquisition of new equipment and infrastructure items to up-date existing electrical laboratory space and technology. New instrumentation and computers (including engineering workstations) have been purchased that will improve testing capabilities and provide for the integration of computer-based testing and measurement.

Two new laboratories are being created for photonics and optoelectronics using DARPA resources. Equipment is being specified that will provide for undergraduate experiences with fiber optics, optical communication, and optical sources and detectors. Additional equipment is being purchased to support research on optical transceiver transmission rates and related bit error ratio testing. The technical electives in the EE program will focus on the area of optoelectronics.

II. Justification for the Program – Narrative Statement

A. Describe the proposed program as it relates to:

1. the institutional mission and strategic plan

WCU is a comprehensive university within the University of North Carolina, offering a broad array of undergraduate and graduate programs in the arts, sciences, and professions. Teaching and learning constitute the central mission. The primary service area is western North Carolina. Development of engineering programs has been part of the WCU Strategic Vision statement for many years. (See planning.wcu.edu/planning/html)

At the March 21, 2003 Board of Governors of the UNC System meeting, the President of the UNC System recommended that "discussions should be initiated immediately between UNC Charlotte and WCU to explore the extension of UNC Charlotte's baccalaureate programs in electrical and computer engineering to the WCU campus, with the goal of establishing a joint degree between the two campuses in one or both of these areas."

At the April 11, 2003 meeting, the Board of Governors approved a process for joint programs to allow interaction between UNC Charlotte and WCU. The joint degree program must be approved through the regular institutional processes and have the approval of the Chancellor of each university prior to submission to the Board of Governors.

The following processes must have been certified for the joint degree program:

a. Admission process

b. Registration and enrollment process for students

c. Plan for charging and distributing tuition and fees

d. Management of transcripts and permanent records

e. Participation in graduation

f. Design of diploma

Each student who will receive a joint degree must be approved by the institutional process for certifying a student to receive a degree by each UNC institution whose name will appear on the diploma.

A Memorandum of Understanding between the two universities that details the operational aspects of the joint degree program is under development. The memorandum contains information regarding program administration, academic requirements, admissions processes, registration procedures, finances, tuition, and fees, program accreditation/assessment, and library.

2. student demand

The demand for an engineering program at Western relies on several factors. The Enrollment Planning Service (EPS) through the College Board has basic data on intended majors of high school students who take the SAT. Of all 2001-2002 SAT test takers in North Carolina, 3,421 students (7%) indicated their intended major is Engineering. Of the students who took the test in 2001-2002 and had their scores sent to Western, 242 (6% of received scores) indicated their intended major was Engineering.

In December 2000, Advantage West-North Carolina, the Western North Carolina Regional Economic Development Agency, commissioned *Market Street Services, Inc.* a community and economic development consulting firm based in Atlanta, Georgia, to facilitate and develop a Workforce Development Plan for the central 10-county region of AdvantageWest. The project looked at three areas: labor market assessment, workforce development resources, and workforce development plan. (See http://www.awnc.org/)

Several statements in the study pointed to the need for engineers in the region.

The most difficult workers to find were manufacturing or skilled workers with 76% of employers saying they had some or great difficulty in finding qualified workers. Fifty-two percent of employers had some or great difficulty in finding supervisory or managerial personnel, and IT professionals, engineers, or analysts. The easiest workers to find were clerical, administrative, or secretarial workers. (p. 10)

While the region has experienced significant amounts of in-migration, these are mostly older individuals who may or may not participate in the labor force. Efforts should be made to retain the skilled workers within the region, particularly graduates from area colleges and universities, young adults who have gone away to attend college and have graduated, as well as alumni, with targeted skill sets across all industry sectors to live and work in the region.

(p. 30)

Western Carolina University is a significant element in the economic development of the western North Carolina region, particularly, in educating young people from the region in engineering. The Center for Integrated Technologies (housed in the Center for Applied Technology) in conjunction with an engineering program has the capability of fostering economic development for the region.

Data from the Bureau of Labor Statistics (BLS) clearly indicates that there is a need for additional electrical engineering graduates in North Carolina and surrounding states. Indeed, the number of graduates from the three state ins titutions does not meet the projected demand as stated by the BLS. (See Section II.A.3)

3. societal need (For graduate, first professional, and baccalaureate professional programs, cite manpower needs in North Carolina and elsewhere.

The following information is occupational projections for electrical and electronic engineers as published by the Bureau of Labor Statistics. (http://almis.dws.state.ut.us/occ/projhome.asp) Manpower needs are cited for North Carolina, surrounding states of South Carolina, Tennessee,

Georgia, and for the United States.

State	Title	1998	2008	Qu
antity	Average	Percent		
		Employment	Employment	E
mployment	Annual	Employment		
				Cha
nge	Openings	Change		
North	Electrical	7700	9650	1
950	360	25		
Carolina	&			
	electronics			
	engineers			

It is quite evident that the projected average annual openings in North Carolina for electrical engineers (360) exceeds the combined number of graduates from North Carolina State University, North Carolina Agricultural and Technical State University, and UNC Charlotte. For example, in 2001-2002, these three universities graduated a total of 212 electrical engineers. (See Section C – Enrollment)

State	Title	1998	2008	Qu
antity	Average	Percent		
		Employment	Employment	Employm
ent	Annual	Employment		
				Cha
nge	Openings	Change		
South	Electrical	2650	3250	6
00	120	22		
Carolina	&			
	electronics			
	engineers			

State	Title	1998 Employment	2008 Employment	Quantity Employment Change	Quantity Employment Change Percent	Annual Average Openings
Tennessee	Electrical & electronics engineers	3850	4600	750	19	160

State	Title	1998 Employment	2008 Employment	Quantity Employment Change	Quantity Employment Change Percent	Annual Average Openings
Georgia	Electrical & electronics engineers	7450	10700	3250	44	480

State	Title	1998 Employment	2008 Employment	Quantity Employment Change	Quantity Employment Change Percent	Annual Average Openings

State	Title	1998	2008	Qu
antity	Average	Percent		
		Employment	Employment	Em
ployment	Annual	Employment		
				Cha
nge	Openings	Change		
United	Electrical	354250	446250	92000
16750	26			
States	&			
	electronics			
	engineers			

A related area of employment for engineers is as managers. While the data below does not specifically cite electrical engineers, it does provide some insight into the general need.

State	Title	1998	2008	Qu
antity	Average	Percent		
		Employment	Employment	Em
ployment	Annual	Employment		
				Cha
nge	Openings	Change		
North	Engineering,	8500	11950	3
450	500	41		
Carolina	natural science,			
	& computer information			
	systems managers			

4. impact on existing undergraduate and/or graduate academic programs of your institution. (e.g., Will the proposed program strengthen other programs? Will it stretch existing resources? How many of your programs at this level currently fail to meet Board of Governors' productivity

criteria? Is there a danger of proliferation of low-productivity degree programs at the institution?)

There is no negative impact on undergraduate programs at Western due to this proposed electrical engineering program. There will be some impact associated with the Joint Program on faculty at UNC Charlotte. Distance course offerings require additional preparation time, time to interact with students and additional work in evaluation of learning. This increases faculty duties and necessitates the addition of faculty to ensure program success. Also, the coordination of the programs will require a dedicated director on both campuses. This will impact the teaching load of the program director.

The proposed program will strengthen both the mathematics and sciences areas. Additional enrollment in higher level mathematics and physics courses will occur. Existing resources are sufficient to handle this increased enrollment.

Typically, some 30-35% of entering freshmen in engineering programs complete the degree. At Western, those who have enrolled in electrical engineering but desire another degree path, may select the electrical and computer engineering technology program, the telecommunications engineering technology program, or the engineering technology program, which have existing capacity to handle more students.

B. Discuss potential program duplication and program competitiveness.

1. Identify similar programs offered elsewhere in North Carolina. Indicate the location and distance from the proposing institution. Include a) public and b) private institutions of higher education.

There are no other joint electrical engineering programs using this format in North Carolina. There are several traditional programs which are located at North Carolina State University-Raleigh, University of North Carolina at Charlotte, and North Carolina Agricultural and Technical State University, Greensboro. Duke University, located in Durham, is a private institution which also offers electrical engineering.

The closest institution to Western is UNC Charlotte which is 200 miles from WCU. Both NC State University and Duke are over 300 miles from WCU. NC A & T is approximately 300 miles from WCU.

2. Indicate how the proposed new degree program differs from other programs like it in the University. If the program duplicates other UNC programs, explain a) why is it necessary or justified and b) why demand (if limited) might not be met through a collaborative arrangement (perhaps using distance education) with another UNC institution. If the program is a first professional or doctoral degree, compare it with other similar programs in public and private universities in North Carolina, in the region, and in the nation.

The proposed electrical engineering program is not a freestanding program at Western. A team of engineering deans was charged by the Board of Governors to determine the need for additional engineering programs in North Carolina. The team recommended that "the faculty and administration at Western Carolina initiate conversations with the School of Engineering at UNC Charlotte to discuss cooperative engineering programs with that institution". (See March 21, 2003

Board of Governors Minutes, Appendix 8)

A joint electrical engineering program in the western North Carolina region of the state would allow students to stay in that region and also would play a role in much needed economic development. Further, it maximizes the resources from both institutions.

C. Enrollment (baccalaureate programs should include only upper division majors, juniors and seniors).

<u>Headcount enrollment</u>

Show a five-year history of enrollments and degrees awarded in similar programs offered at other UNC institutions (using the format below for each institution with a similar program): indicate which of these institutions you consulted regarding their experience with student demand and (in the case of professional programs) job placement. Indicate how their experiences influenced your enrollment projections.

The programs listed below are traditional four-year electrical engineering programs and not joint engineering programs. The enrollment figures reflect upper division only. The data is for academic years 1999 through 2002. (See UNC-GA ProgAssess/SDF.PR006/28MAY03)

Institution: North Carolina Agricultural and Technical State University

Program Title: Electrical Engineering

	Fall 99	Spr 00	Fall 00	Spr 01	Fall 01	Spr 02
Enrollment	127	118	124	123	121	137

	1999-2000	2000-2001	2001-2002
Degrees-awarded	38	46	43

Institution: University of North Carolina-Charlotte

Program Title: Electrical Engineering

	Fall 99	Spr 00	Fall 00	Spr 01	Fall 01	Spr 02
Enrollment	139	146	124	143	142	143

	1999-2000	2000-2001	2001-2002
Degrees-awarded	42	40	46

Institution: North Carolina State University

Program Title: Electrical Engineering

	Fall 99	Spr 00	Fall 00	Spr 01	Fall 01	Spr 02
Enrollment	406	391	410	404	417	407

	1999-2000	2000-2001	2001-2002
Degrees-awarded	141	139	123

Enrollment projection in the proposed program for four years and the basis for the projections.

	Year 1 (2004-2005)	Year 2 (2005-2006)	Year 3 (2006-2007)	Year 4 (2007-2008)
Full-time	60	116	174	214
Part-time	0	0	0	0

TOTALS	60	116	174

214

The basis for these projections include an attrition rate of 40% of the majors at the end of the first year with 30% of the original majors completing the degree program. The anticipated freshman enrollment is 60 for year 1, 80 for year 2, 100 for years 3 and 4, respectively.

Please indicate the anticipated steady-state headcount enrollment after four years:

Full-time __214__ Part-time __0__ Total __214__

SCH production (upper division program majors, juniors and seniors *only*, for baccalaureate programs).

Project the SCH production for four years. Explain how SCH projections were derived from enrollment projections (see UNC website for a list of the disciplines comprising each of the four categories).

Projected freshman enrollment is 60 for year 1, 80 for year 2 and 100 for years 3 and 4, respectively. It is anticipated that 40% of each freshman class will not continue into the sophomore year and that 30% of the entering freshman class will continue on to graduate from the degree program.

	Total Credits	**Y1 enroll**	**Y1 SCH**	**Y2 enroll**	**Y2 SCH**	**Y3 enroll**	**Y3 SCH**	**Y4 Enroll**	**Y4 SCH**
Freshman Year									
Level 1 credit	20	60	1200	80	1600	100	2000	100	2000
Level 2 credit	0	60	0	80	0	100	0	100	0
Level 3 credit	8	60	480	80	640	100	800	100	800
Level 4 credit	2	60	120	80	160	100	200	100	200
Sophomore									
Level 1 credit	6			36	216	48	288	60	360

Level 2 credit	0		36	0	48	0	60	0
Level 3 credit	6		36	216	48	288	60	360
Level 4 credit	19		36	684	48	812	60	1140
Junior								
Level 1 credit	6				26	156	36	216
Level 2 credit	0				26	0	36	0
Level 3 credit	0				26	0	36	0
Level 4 credit	26				26	676	36	936
Senior								
Level 1 credit	6						18	108
Level 2 credit	3						18	54
Level 3 credit	12						18	216
Level 4 credit	13						18	234
Total credits	127							

All Levels

Annual Total	Funding Factor	Y1 Positions	Y1 SCH	Y2 Positions	Y2 SCH	Y3 Positions	Y3 SCH	Y4 Positions	Y4 SCH
Level 1 credit	643.72	1.9	1200	2.8	1816	3.8	2444	4.2	2684
Level 2 credit	487.37	0.0	0	0.0	0	0.0	0	0.1	54
Level 3 credit	364.88	1.3	480	2.3	856	3.0	1088	3.8	1376
Level 4 credit	230.52	0.5	120	3.7	844	7.8	1788	10.9	2510
Total SCH:Positions		3.7	1800	8.8	3516	14.5	5320	18.9	6624
Total enrolled by year		60		116		174		214	

Junior/Senior Only

Annual Total	Funding Factor	Y1 Positions	Y1 SCH	Y2 Positions	Y2 SCH	Y3 Positions	Y3 SCH	Y4 Positions	Y4 SCH
Level 1 credit	643.72	0.0		0.0		0.2	156	0.5	324
Level 2 credit	487.37	0.0		0.0		0.0		0.1	54
Level 3 credit	364.88	0.0		0.0		0.0		0.6	216
Level 4 credit	230.52	0.0		0.0		2.9	676	5.1	1170
Total SCH:Positions		0.0	0	80.0	0	3.2	832	6.3	1764

III. Program Requirements and Curriculum

A. Program Planning.

1. List the names of institutions with similar offerings regarded as high quality programs by the developers of the proposed program.

Many universities across the USA, in addition to UNC Charlotte, offer strong high quality electrical engineering programs. The colleges listed below are similar to Western in that they are comprehensive in nature, have similar missions, and have electrical engineering programs.

University of Wisconsin-Platteville

University of South Alabama

University of Evansville

Western Kentucky University

2. List other institutions visited or consulted in developing this proposal. Also discuss or append any consultants' reports, committee findings, and simulations (cost, enrollment shift, induces course load matrix, etc.) generated in planning the proposed program.

An "Undergraduate Engineering Study" was concluded in May 2000. The thrust of this study was to determine budget, space requirements, faculty positions, and enrollment projections for both electrical and mechanical engineering programs at peer institutions to Western. Representatives from Western visited Minnesota State University at Mankato, St. Cloud University and Bradley University. Additional information was gathered from

UNC Charlotte, Georgia Southern University, and EAC/ABET.

For the joint program in electrical engineering, a number of traditional program curriculums were reviewed. These included electrical engineering programs at NC State University, Clemson University, Georgia Tech, and Purdue University.

B. Admission. List the following:

1. Admissions requirements for proposed program (indicate minimum requirements and general requirements).

Applicants to the joint electrical engineering program will meet the general admission requirements of their home institution. WCU and UNC Charlotte are open to all qualified students without regard to race, sex, color, national origin, religion, age, sexual orientation, or disability.

First-Year Students. Admission to Western Carolina University and placement into courses and programs are based upon a variety of factors including courses taken in high school, rank in class, SAT or ACT scores, and high school grade point average. Applicants must be graduates of accredited high schools. Graduates of unaccredited high schools may satisfy entrance requirements by examination. The university reserves the right to require any conditions deemed necessary. Applications also are considered for admission from prospective students who have achieved high school graduation equivalency by means of tests of General Education Development (GED).

Applicants to the electrical engineering program at WCU will adhere to the same guidelines as established for these majors at UNC Charlotte.

Freshman admission is competitive. Based upon an overall evaluation of high school record with particular emphasis on advanced course in math and science and test scores, freshmen may be admitted directly to the Freshman Engineering Program. *Transfers* must present a GPA of at least 2.50 and meet the same

mathematics requirements as engineering freshmen using either high school or college mathematics courses. All transfers will be admitted to the lower division of the electrical engineering program, and evaluation of transfer credits to the program will be performed by the Registrar and the Department Head. Transfers from an ABET accredited engineering program who do not have a 2.50 GPA may be admitted upon the recommendation of the Department Head.

Mathematics Placement Procedures. All students making application to the electrical engineering program must take a mathematics placement examination to determine the appropriate entry-level mathematics course for them.

Freshman Engineering (FENG) is an individualized advising program for all entering students who intend to major in electrical engineering. Upon successful completion of this first year, the student is transferred to the EE major.

Freshman Year Requirements. All new freshman students are initially advised by a faculty associate in the Department of Engineering Technology. Students are eligible to transfer to the electrical engineering major upon 1) completion of all non-elective courses in their freshman year curriculum with grades of *C* or better, and 2) a minimum cumulative grade point average (GPA) of 2.00 for all courses taken.

Sophomore through Senior Year Requirements. In addition to the home University's requirements for continued enrollment, students must maintain a cumulative GPA in the major of 2.00 for all courses taken within the program. A student is suspended from the electrical engineering program when the student fails to achieve good standing by the end of two successive semesters on probation (excluding summer sessions).

1) *Requirements for Readmission after Discontinuation in Program.*

A student who has been suspended by the University must follow University guidelines for appeal. Readmission to the electrical engineering program after discontinuation or suspension is not automatic. An application for readmission must be made by the student and approved by the home institution's College and

Department. Students who are readmitted after discontinuation by the Department, or suspension by the University, must meet requirements for continued enrollment appropriate to their individual situation. These requirements are specified in a "Continuation Agreement" that is mutually agreed upon and signed by the student and his/her appropriate advisor. The consequences of failure to meet the requirements of the agreement may be articulated in the agreement itself. However, if these consequences are not included in the agreement, failure to meet the requirements will automatically result in the student's discontinuation from the electrical engineering program.

2. Documents to be submitted for admission (listing or sample).

Entrance Examinations. Freshman applicants must take the Scholastic Aptitude Test (SAT) or the American College Test (ACT). The achievement test in subject-matter fields is not required. For the SAT, application forms and information concerning the test fee, dates, and centers may be obtained from the College Board, P.O. Box 592, Princeton, New Jersey 08541. Information and application for the ACT may be obtained from The American College Test National Office, P.O. Box 168, Iowa City, Iowa 52243, and from high school guidance counselors. Applicants must request that their scores be sent to the Office of Admissions, Western Carolina University, Cullowhee, North Carolina 28723. College code for the SAT is 5897 and ACT code is 3172.

Secondary School Preparation. The quality and content of the applicant's high school program are important. A good background in English, mathematics, foreign language, social studies, and natural sciences is recommended. Students with inadequate preparation in English and mathematics, if admitted, will be

required to complete additional work in these areas.

To be considered for any category of admission, students must have graduated from high school and successfully completed the following twelve units of college preparatory courses in high school:

4 units of English

2 units of algebra

1 unit of geometry or advanced math

3 units of science including

1 unit of a life or biological science

1 unit of a physical science

1 unit of an additional lab science

2 units of social studies including

1 unit in U.S. history

It is highly recommended that students complete at least two years of a foreign language in high school. Effective in the fall semester of 2004, two units of a language other than English will be required. Also effective in the fall of 2004, one additional unit of mathematics beyond algebra II will be required.

(See http://www.wcu.edu/UnivCatalog/Catalog/admis/admissions.htm)

C. Degree requirements. List the following:

1. Total hours required. Major. Minor.

The BSEE requires 127 semester hours.

2. Proportion of courses open only to graduate students to be required in program (graduate programs only).

There is no program at the graduate level in EE at Western Carolina University.

3. Grades required.

Freshman Year Requirements. All new freshman students are initially advised by a staff member in the Department of Engineering Technology. Students are eligible to transfer to the electrical engineering major upon 1) completion of all non-elective courses in their freshman year curriculum with grades of *C* or better, and 2) a minimum cumulative grade point average (GPA) of 2.00 for all courses taken.

Sophomore through Senior Year Requirements. In addition to the University requirements for continued enrollment, students must maintain a major cumulative GPA of 2.00 for all courses taken within the electrical engineering program. Failure to meet this requirement for two consecutive semesters will result in suspension from the

electrical engineering program.

The following grading system will be used for all courses designated EE and ENGR:

Letter	**Interpretation**	**Quality Points per Semester Hour**
A	Excellent	4.0
B	Good	3.0
C	Satisfactory	2.0

D	Poor	1.0
F	Failure	0.0
I	Incomplete	--
IP	In Progress	--
S	Satisfactory	--
U	Unsatisfactory	--
W	Withdrawal	--
AU	Audit	--
NC	No Credit	--

The remaining courses in the EE program will follow the WCU grading system as stated in the college catalog.

4. Amount of transfer credit accepted.

Credit and Placement Policies

Evaluation of transfer, College Level Examination Program (CLEP), and advanced placement credits are coordinated through the Office of the Registrar. The university will accept or transfer appropriate undergraduate credits earned through credit by examination, advanced placement, CLEP, correspondence courses, extension courses, armed forces service schools, and college-level courses completed prior to graduation from high school. With the approval of the appropriate academic departments, the amount of such credit which may be

applied toward a degree is subject to limitation only by the university's general residence requirement and the prescribed courses in the major field of study; the degree program may not exceed 45 semester hours of CLEP credit. Credit toward a degree is not awarded for Continuing Education Units or for General Education

Development tests (GED).

Transfer of Credit. An evaluation of credits offered in transfer is completed after admission and after all official records are received directly from each institution previously attended. The applicability of transferred credits toward degree requirements is determined by the registrar's office and the department head of the student's major. In some cases, due to accreditation standards, validation of a course by successful completion of more advanced work in the same discipline or by examination may be required.

Only work passed with a grade of C (2.0) or better may be transferred. Courses with other grading systems that are equivalent to a C or better may be transferred. Except for consortium agreements, no credit will be allowed toward graduation or toward fulfillment of major requirements for a course passed with a C- or less at another institution. Credit will not be awarded for courses determined to be below the collegiate level nor from an institution not accredited by a nationally recognized regional accrediting agency. Undergraduate credit will not be

awarded for graduate-level courses.

A Comprehensive Articulation Agreement (CAA) has been developed by the North Carolina Community College (NCCC) system and the University of North Carolina (UNC) General Administration providing for the transferability of a student's first two years of collegiate work to a senior UNC institution. This agreement provides that a student who enrolls at a NCCC

institution fall 1997 or later, and completes his/her home institution's 44 semester hours of general education requirements with a grade of C or better in each course, is guaranteed

that those hours will be applied toward a baccalaureate degree at any UNC institution. These 44 hours must be used to satisfy the receiving institution's liberal studies requirements. In addition, the CAA also guarantees that upon

completion of the Associate of Arts or Associate of Science degree, 20-21 hours of pre major work with a grade of C or better will be transferred and applied toward the student's baccalaureate degree at a UNC institution provided that the student remains within their major.

Credit may be transferred from a technical program of a two-year institution and applied toward an appropriate bachelor's degree if the institution is fully accredited or is a candidate for regional accreditation. A minimum of twenty-five percent of semester hours applied toward a bachelor's degree must be earned through regular enrollment in Western Carolina University junior-senior level courses, including a minimum of twelve hours in junior-senior courses in the major field.

In addition to those credits accepted as equivalents of the university's freshman and sophomore courses, a maximum of thirty hours of credit may be allowed toward graduation for freshman and sophomore courses completed at other

institutions which are normally offered above the sophomore level at Western Carolina University. There is no time limit on the course work accepted for undergraduate transfer credit. However, students who plan to schedule courses with stated prerequisites should consider auditing the prerequisite courses if no work has been attempted in the field within the past five years.

Regularly enrolled students who desire to take any course at another institution on a transient basis for transfer to WCU must secure the appropriate department head's and the registrar's approval before enrollment at the other institution. Transient Permission Forms are available in the registrar's office and the departments. Students must be in good standing and eligible to re-enroll at Western Carolina University to secure transient permission. Course work taken at an institution which has a consortium agreement with Western Carolina University will be given credit on the same basis as course work taken at WCU.

Grades made in transferred courses are not considered in computing the GPA at Western Carolina University, but transferred hours are added to earned hours and will affect the student's overall academic standing. A student may not expect to have the repeat course policy applied on

the basis of courses completed at other institutions. Currently enrolled and former students (those not enrolled for one or more of the immediately preceding semesters, excluding summer terms) who attempt courses at other institutions must earn a cumulative 2.0 GPA and submit official transcripts of all work attempted to the Office of Admissions in order to be eligible to return to WCU.

Transfers must present a GPA of at least 2.50 and meet the same mathematics requirements as engineering freshmen using either high school or college mathematics courses. All transfers will be admitted to the lower division of the

electrical engineering program, and evaluation of transfer credits to the program will be performed by the Registrar and the Department Head. Transfers from an ABET accredited engineering program who do not have a 2.50 GPA may be admitted upon the recommendation of the Department Head.

5. Other requirements (e.g., residence, comprehensive exams, thesis, dissertation, clinical of field experience, "second major", etc.)

General University Degree Requirements

To be awarded a bachelor's degree, the student must meet the following general

requirements:

1. Completion of a minimum of 120 semester hours to a maximum of 128 semester hours under requirements outlined for one of the degree programs.

2. A minimum GPA of 2.0 on all work attempted at Western Carolina University and on all courses in the major.

3. A minimum of 25 percent of semester hours applied toward a bachelor's degree must be earned through regular enrollment in Western Carolina University junior-senior level courses, including a minimum of twelve hours in

junior-senior courses in the major field.

4. Fifty percent or more of the credits in the major presented for graduation on the junior-senior level unless the degree program being completed by the student is specifically exempted from the requirement.

5. Be enrolled at Western the intended graduation semester. (Students who wish to pursue an exception to this rule must contact the Registrar's Office.

6. Language and/or research requirements. There are no language and/or research requirements.

7. Any time limits for completion.

There is no time limit on the course work accepted for undergraduate transfer credit. However, students who plan to schedule courses with stated prerequisites should consider auditing the prerequisite courses if no work has been attempted in the field within the past five years.

D. List existing courses by title and number and indicate (*) those that are required. Include an explanation of numbering system. List (under a heading marked "new") and describe new courses proposed.

The course numbering system is quite traditional. For example, a 1xx is a freshman course, a 2xx is a sophomore course, and so on. There is no particular significance to the last two digits.

Liberal Studies component (42 semester hours) required.

The major courses listed in the crosswalk below are required in the EE curriculum.

UNC Charlotte /WCU Electrical Engineering Curriculums

Course Crosswalk

UNC Charlotte	**WCU**

ENGR 1201	Intro. to Engrng Practice/Principles I	ENGR 191
ENGR 1202	Intro. to Engrng Practice/Principles II	ENGR 192
ENGR 3295	Professional Development	ENGR 300
ECGR 2103	Computer Utilization in C++	EE 200
ECGR 2111	Network Theory I	EE 211
ECGR 2112	Network Theory II	EE 212
ECGR 2155	Logic and Networks Lab	EE 201
ECGR 2156	Instrumentation and Networks Lab	EE 202
ECGR 2181	System Design I	EE 221
ECGR 2252	Electrical Engineering Design I	EE 222
ECGR 3111	Signals and Systems	EE 311
ECGR 3121	Introduction to Electromagnetic Fields	EE 321
ECGR 3122	Electromagnetic Waves	EE 322
ECGR 3131	Fund of Electronics and Semiconductors	EE 331
ECGR 3132	Electronics	EE 332
ECGR 3133	Solid State Microelectronics I	EE 322
ECGR 3155	Systems and Electronics Lab	EE 301
ECGR 3156	E-M and Electronic Devices Lab	EE 302
ECGR 3157	Electrical Engineering Design II	EE 341
ECGR 3159	El. Eng. Professional Practice	EE 402
ECGR 3253	Senior Design I	EE 411
ECGR 3259	Senior Design II	EE 412
ECGR 4123	Communication Theory	EE 421

ECGR xxxx Senior Elective EE xxx

Technical Elective I

Technical Elective II

Technical Elective III

The following courses are a listing of the required mathematics and sciences.

MATH 1zz Engineering Calculus I*

MATH 2xx Engineering Calculus II*

MATH 2yy Engineering Calculus III*

MATH 320 Ordinary Differential Equations

MATH 370 Probability and Statistics

CHEM 132 Introductory Chemistry

PHY 230 General Physics

PHY 2xx Fundamentals of Optics and Materials**

PHY 310 Modern Physics

Science Elective

*Current calculus courses are four credits; three credit courses in Engineering Calculus will be developed to match courses at UNC Charlotte.

**New course. "Introductory course covering the fundamentals of geometrical optics and their interrelationship with material optical properties". 2 Lecture; 2 Laboratory.

IV. Faculty

A. List the names of persons now on the faculty who will be directly involved in the proposed program. Provide complete information on each faculty member's education, teaching experience, research experience, publications, and experience in directing student research, including the number of theses and dissertations directed for graduate programs. The official roster forms approved by SACS can be submitted rather than actual faculty vita.

Faculty from the Department of Electrical and Computer Engineering at UNC Charlotte and the credentialed Department of Engineering Technology will form a Joint Faculty for the Joint Program in Electrical Engineering. The Joint Faculty will include all qualified faculty members from each institution.(See Appendix A for vitas)

UNC Charlotte Faculty

David M. Binkley, Ph.D., P.E.

Stephen M. Bobio, Ph.D.

Robert J. Coleman, Ph.D.

Kasra Daneshvar, Ph.D.

M. A. Hasan, Ph.D.

Ivan Howitt, Ph.D.

J. Edward Jenkins, Jr., Ph.D.

Yogendra P. Kakad, Ph.D.

V. P. Lukic, Ph.D.

Mehdi Miri, Ph.D.

Arindam Mukherjee, (Ph.D. anticipated September 2003)

Asis Nasipuri, Ph.D.

D. Howard Phillips, Ph.D.

Edward B. Stokes, Ph.D.

Farid Michel Tranjan, Ph.D. (Department Head, Electrical & Computer Engineering)

Raphael Tsu, Ph.G. (Distinguished Professor)

Thomas Paul Weldon, Ph.D., P.E.

Lawrence R. Whicker, Ph.D.

WCU Faculty

Duane D. Dunlap, Ed.D. (Department Head, Engineering Technology)

Kenneth A. Burbank, Ph.D.

James Zhang, Ph.D.

Dr. Dunlap, Department Head for Engineering Technology, will assume the administrative duties for the EE program. Dr. Burbank, who is EAC/ABET qualified and currently program coordinator for Electrical and Computer Engineering Technology, will assume responsibilities as director of the EE program. WCU will conduct nationwide searches to secure faculty who are EAC/ABET qualified to teach the on-site EE courses. A search committee formed from the joint faculty at the two institutions will oversee the search process and make a recommendation to the WCU program director. Input will be solicited during the search from the entire joint faculty at both

institutions.

B. Estimate the need for new faculty for the proposed program over the first four years. If the teaching responsibilities for the proposed program will be absorbed in part or in whole by the present faculty, explain how this will be done without weakening existing programs.

WCU will require one additional EAC/ABET qualified faculty for fall 2004 to initiate the joint EE program. The primary duties for this individual will be instruction in the freshman engineering courses, and advising and recruiting.

As entering freshman enrollment increases, additional lecture and laboratory sections will increase. It is anticipated that three faculty will be necessary in the second year, five faculty in the third year, and seven faculty in the fourth year to maintain the ongoing program as specified in this proposal.

UNC Charlotte will require two additional faculty to offer the program after year two. There will also be a need for half-time program director beginning in the first year to coordinate the start-up of the joint degree program.

C. If the employment of new faculty requires additional funds, please explain the source of funding.

The source of funding for new faculty will come from "focus growth money", enrollment growth money and re-allocation of internal resources at WCU and UNC Charlotte.

D. Explain how the program will affect faculty activity, including course load, public service activity, and scholarly activity.

It is anticipated that faculty activity, course loads, public service will be typical of that in traditional engineering programs.

V. Library

A. Provide a statement as to the adequacy of present library holdings for the proposed program.

WCU's Hunter Library collections are not currently adequate to support this program. This is a new program in an area that the Library was not called upon in the past to build collections to support. There is a reasonable collection of science-related materials, but little specifically in Engineering. Monographs, media and journals are being purchased to support this program. In addition, the Library will need to license access to Engineering-related

databases.

B. State how the library will be improved to meet new program requirements for the next five years. The explanation should discuss the need for books, periodicals, reference materials, primary source material, etc. What additional library support must be added to areas supporting the proposed program?

Hunter Library has been, and will continue to, purchase monograph and media collections to support this program. It is anticipated that the Library will need to invest $10,000 per year for the first year or two, and will then be able to scale back to between $5,000 - $7,000 per year.

The Library may also need to spend approximately $20,000 to license access to the IEEE databases and electronic journals. If needed, licenses for additional databases such as COMPENDEX will cost approximately $40,000 per year.

C. Discuss the use of other institutional libraries.

Hunter library provides free Interlibrary Loan services to all undergraduate and graduate students and to faculty. The average time required for a student or faculty to receive articles requested on Interlibrary Loan is about 3 days.

In addition, the Library provides free document delivery service from Ingenta for all undergraduate and graduate students and faculty This service costs the Library on average between $35-$50 per article. Ingenta provides access to articles from approximately 25,000 journal titles from a wide range of disciplines, including the sciences and Engineering. There are over 240 Computer Science journals and 60 Electrical and Nuclear Engineering journals

(these two areas are grouped together) available via Ingenta. The student or faculty generally receives the article in less that 24 hours, either via email or via fax.

Students enrolled in the joint degree program will have access to the collections and services of both the Hunter Library at WCU and the Atkins Library at UNC Charlotte, subject to review of existing license agreements.

VI. Facilities and Equipment

A. Describe facilities available for the proposed program.

WCU's Department of Engineering Technology maintains 14 laboratories for instruction. Five of these laboratories are dedicated to electrical and telecommunications engineering technology. All are equipped with modern computers for simulation exercises and interfacing activities. Other laboratories are used for engineering computing graphics, rapid prototyping, manufacturing automation, machining, and metrology. A new building, the Center for Applied Technology, provides four additional laboratories with approximately 15,000 square feet and two additional

classrooms. The laboratories associated with the Joint Degree program will be taught locally at WCU and UNC Charlotte.

Existing Electrical Laboratories

Analog Electronics

Digital Electronics

Digital Communications

Telecommunications and Networking

Electronics Fabrication

Laboratories under development

Optical Systems

Optoelectronics

Facilities currently exist for the study of modern analog and digital electronic systems, with a separate laboratory devoted to Digital Communications. Ongoing renovations to these laboratories include new test and measurement equipment that can be computer controlled. These laboratories support the current Electrical and Computer Engineering Technology and Telecommunications Engineering Technology programs, both of which involve the design, control, and test of electronic systems.

The DARPA grant is being used to establish additional facilities focused on optical system design and test. Two new laboratory spaces are being renovated and new equipment is being purchased to facilitate the student construction of optical communication systems as well as the testing of high speed optical transceivers.

A dedicated computer and instructional classroom will be created specifically for enhancing success in mathematics problem solving.

B. Describe the effect of this new program on existing facilities and indicate whether they will be adequate, both at the commencement of the program and during the next decade.

WCU's facilities are adequate for this program.

C. Discuss any information technology services needed and/or available.

WCU will remodel and develop an additional distance education facility in 104 Belk. UNC Charlotte will require equipment to outfit two classrooms in the Science and Technology

Building for distance education delivery including computers, cameras, projectors, sound system, and associated equipment. Both institutions will require software licenses and additional full-time technical support personnel.

D. Discuss sources of financial support for any new facilities and equipment.

WCU has received an award ($4.7 million dollars) which is being administered by the Defense Advanced Research Projects Agency (DARPA). Approximately seventy percent of this award is being allocated to the acquisition of new equipment and infrastructure items to up-date existing electrical laboratory space and technology. New instrumentation and computers are being purchased that will improve testing capabilities and provide for the

integration of computer-based testing and measurement.

VII. Administration

Describe how the proposed program will be administered, giving the responsibilities of each department, division, school, or college. Explain any inter-departmental or inter-unit administrative plans. Include an organizational chart showing the "location" of the proposed new program.

For purposes of program administration, the Dean of Engineering at UNC Charlotte and the Dean of the College of Applied Sciences at WCU or a designee of the Chief Academic Officer at each institution will be responsible for appointing a campus director for the joint program. The directors will be responsible for the program operation and accreditation. The constituent faculties involved with the joint program at WCU and UNC Charlotte will appoint a minimum of three faculty at their respective institutions to serve as Joint Faculty Curriculum Committee. The

Joint Faculty of WCU and UNC Charlotte will have responsibility for determining curriculum, program objectives and outcomes, admission standards, assessment methodology, and standards for student progression and graduation. Admission standards to the program shall be determined by the Joint Faculty and implemented by an admissions committee at each campus.

The electrical engineering program at WCU will be located in the Department of Engineering Technology. The department name will be changed to the Department of Engineering and

Technology upon approval of this proposal. The Department Head reports to the Dean of the College of Applied Sciences who reports to the Vice Chancellor of Academic Affairs for WCU.

VIII. Accreditation

Indicate the names of all accrediting agencies normally concerned with programs similar to the one proposed. Describe plans to request professional accreditation. If the proposed new degree program is at a more advanced level than those previously authorized or if it is in a new discipline division, was SACS notified of a potential "substantive change" during the planning process? If so, describe the response from SACS and the steps that have been taken to date with reference to the applicable procedure.

The appropriate accrediting body is the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. The EE program at UNC Charlotte is ABET accredited and is now undergoing consideration for re-accreditation. Accreditation efforts will begin immediately so that an initial visit can be requested once the first class graduates. This accreditation cycle is usually six years. The accreditation will be the responsibility of the Joint Faculty of the program and will be under the supervision of the program directors.

SACS has been informally informed of this program initiative.

IX. Supporting Fields

Are other subject-matter fields at the proposing institution necessary or valuable in support of the proposed program? Is there needed improvement or expansion of these fields? To what extent will such improvement or expansion be necessary for the proposed program?

The subject matter fields of mathematics and sciences are particularly crucial to this program.

These fields have adequate resources to support this degree program at WCU.

X. Additional Information

Include any additional information deemed pertinent to the review of this new degree program proposal.

A Memorandum of Understanding is under development.

XI. Budget

Provide estimates (using the attached form) of the additional costs required to implement the program and identify the proposed sources of the additional required funds. Use SCH projections (section II.C.) to estimate new state appropriations through enrollment increase funds. Prepare a budget schedule for each of the first three years of the program, indicating the account number and name for all additional amounts required. Identify EPA and SPA positions immediately below the account listing. New SPA positions should be listed at the first step in the salary range using the SPA classification rates currently in effect. Identify any larger or specialized equipment

and any unusual supplies requirements.

For the purposes of the second and third year estimates, project faculty and SPA position rates and fringe benefits rates at first year levels. Include the continuation of previous years(s) costs in second and third year estimates.

Additional state-appropriated funds for new programs may be limited. Except in exceptional circumstance, institutions should request such funds for no more than three years (e.g., for startup equipment, new faculty positions, etc.) at which time enrollment increase funds should be adequate to support the new program. Therefore it will be assumed that requests (in the "New Allocations" column of the following worksheet) are for one, two, or three years unless the institution indicates a continuing need and attaches a compelling justification. However, funds

for new programs are more likely to be allocated for limited periods of time.

See attached budget sheets from WCU and UNC Charlotte.

XII. Evaluation Plans

All new degree program proposals must include an evaluation plan which includes: (a) the criteria to be used to evaluate the quality and effectiveness of the program, (b) measures to be used to evaluate the program, (c) expected levels of productivity of the proposed program for the first four years of operation (number of graduates), (d) the names, addresses, e-mail addresses, and telephone number of at least three persons (six reviewers are needed for graduate programs) qualified to review this proposal and to evaluate the program once operational, and (e) the plan

and schedule to evaluate the proposed new degree program prior to the completion of its fifth year of operation once fully established.

Program Evaluation Format

A. Criteria to be used to evaluate the proposed program.

The basic program assessment procedures in place at UNC Charlotte for the BSEE program at that site will be adopted for the joint BSEE program. The joint BSEE program will meet EAC/ABET accreditation criteria.

B. Measures to be used to evaluate the program.

Success at obtaining accreditation by the EAC/ABET is the primary measure for evaluating the program. The approach to Freshman Engineering will be tailored after that at UNC Charlotte. Data regarding success in the joint engineering program will be compared to that of the traditional program at UNC Charlotte.

C. Projected productivity levels (number of graduates):

There will be no graduates during the first three years of the EE program. Freshman courses will begin Fall 2004, followed by sophomore courses, junior courses and senior courses on a yearly basis. Given an anticipated enrollment in Year 1 of 60 freshman and a four-year completion rate of 30%, it is anticipated that in Year 4 there will be 18 graduates. Following this same reasoning, with 80 freshman entering in Year 2, there will be 24 graduates in Year 5.

Level	Year 1	Year 2	Year 3	Year 4	Year 5	Total
B	0	0	0	18	24	42
M						
I/P						
D						

(Key: B-Bachelor's, M-Master's, I/P-Intermediate or Professional, D-Doctoral)

D. Recommended consultant/reviewers: Names, titles, addresses, e-mail addresses, and telephone numbers. May not be employees of the University of North Carolina.

Yi Zheng, Ph.D.

Professor and Chair

Department of Electrical and Computer Engineering

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MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: February 10, 2004

RE: Request to make changes to catalog copy and to the title of ECGR 4101/5101

The request to make changes to catalog copy and to the title of ECGR 4101/5101 was approved by the chair of the Undergraduate Course and Curriculum Committee on February 17, 2004 for immediate implementation.

New catalog copy (changes in blue)

ECGR 4101. Embedded Systems. (3)

Prerequisite: ITCS 3182 or ECGR 3183. Introduction to designing microcontroller-based

embedded computer systems using assembly and C programs. Examination of real-time

operating systems and their impact on performance. Computer engineering applications

will be emphasized. *(Fall)*

cc: Dr. Rick Lejk
Dr. James Conrad

Dr. Farid Tranjan

Mr. Stefanos Arethas

Mr. Richard Yount

Mr. Craig Fulton

Ms. Peggy Gordon

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: December 8, 2003

RE: Request to establish the following courses in Industrial Internship: CEGR 6990, ECGR 6990/8990. EMGT 6990 and MEGR 6990/8990.

The request to establish the following courses in Industrial Internship: CEGR 6990, ECGR 6990/8990. EMGT 6990 and MEGR 6990/8990 was approved by the Graduate Council on November 4, 2003 and by Faculty

Council on the November 20, 2003 Consent Calendar for immediate implementation.

New catalog copy

CEGR 6990. Industrial Internship. (1-3) Prerequisite: Completion of nine hours of

graduate coursework. Full- or part-time academic year internship in engineering

complementary to the major course of studies and designed to allow theoretical and

course-based practical learning to be applied in a supervised industrial experience. Each

student's program must be approved by their graduate program director. Requires a mid-

term report and final report to be graded by the supervising faculty. (on demand)

ECGR 6990/8990. Industrial Internship. (1-3) Prerequisite: Completion of nine hours

of graduate coursework. Full- or part-time academic year internship in engineering

complementary to the major course of studies and designed to allow theoretical and

course-based practical learning to be applied in a supervised industrial experience. Each

student's program must be approved by their graduate program director. Requires a mid-

term report and final report to be graded by the supervising faculty. (on demand)

EMGT 6990. Industrial Internship. (1-3) Prerequisite: Completion of nine hours

of graduate coursework. Full- or part-time academic year internship in engineering

complementary to the major course of studies and designed to allow theoretical and

course-based practical learning to be applied in a supervised industrial experience. Each

student's program must be approved by their graduate program director. Requires a mid-

term report and final report to be graded by the supervising faculty. (on demand)

MEGR 6990/8990. Industrial Internship. (1-3) Prerequisite: Completion of nine hours

of graduate coursework. Full- or part-time academic year internship in engineering

complementary to the major course of studies and designed to allow theoretical and

course-based practical learning to be applied in a supervised industrial experience. Each

student's program must be approved by their graduate program director. Requires a mid-

term report and final report to be graded by the supervising faculty. (on demand)

cc: Dr. Rick Lejk
Dr. David Young

Dr. Farid Tranjan

Dr. Anthony Brizendine
Dr. Jayaraman Raja

Mr. Stefanos Arethas

Mr. Richard Yount

Mr. Craig Fulton

Ms. Peggy Gordon

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: December 1, 2003

RE: Request to revise Civil Engineering BSCE undergraduate curriculum

The request to revise Civil Engineering BSCE undergraduate curriculum was approved by the chair of the Undergraduate Course and Curriculum Committee on November 6, 2003 for immediate implementation.

§ Students will be required to successfully take either CEGR 3221 – Structural Steel Design I
or CEGR 3225 – Reinforced Concrete Design I.

§ An existing BSCE degree requirement for all CE students to take 3 or 4 specified, 1 credit-hour
laboratory courses will be changed to require all students to take all 4 courses, thereby adding
1 credit hour to the BSCE curriculum. These four courses are:

CEGR 3155 – Environmental Laboratory (1 cr.)

CEGR 3153 – Transportation Laboratory (1 cr.)
CEGR 3255 – Structures and Materials Laboratory (1 cr.)
CEGR 3258 – Geotechnical Laboratory (1 cr.)

§ An existing 3-credit, requires course, CEGR 3202 – systems and Design II, will be revised to
provide 4 credits.

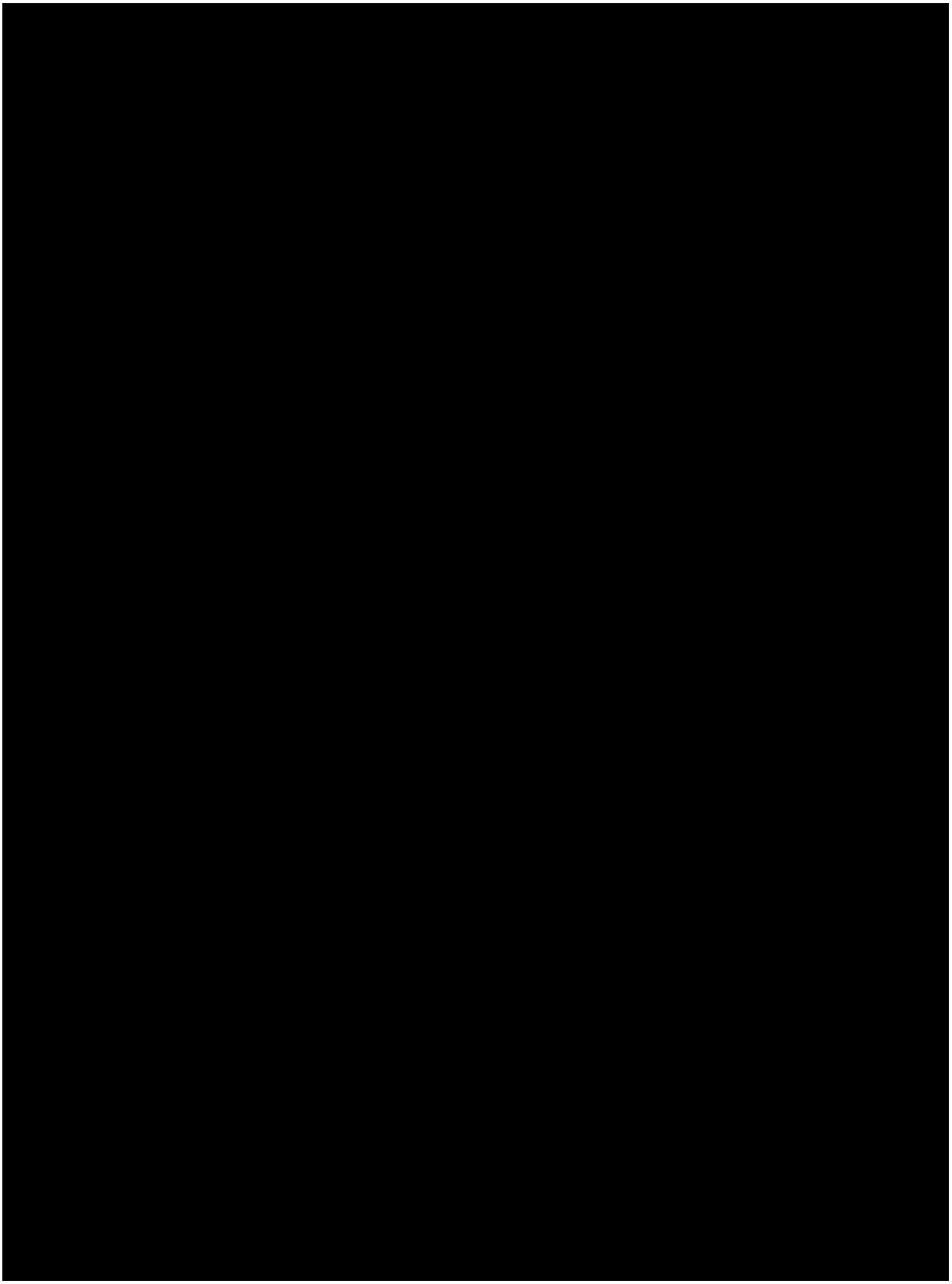
New catalog copy

CEGR 3202. Systems and Design II. (4)

Prerequisite: CEGR 3201. Continuation of CEGR 3201. Creatively investigate and produce

alternative solutions for a comprehensive engineering project resulting in written and verbal class

presentations. One hour of lecture and three hours of laboratory per week. *(Spring)*



cc: Dr. Rick Lejk
Dr. David Young

Mr. Stefanos Arethas

Mr. Richard Yount

Mr. Craig Fulton

Ms. Carolyn Thigpen

Advising Team

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MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: November 12, 2003

RE: Request to remove ETGR 3272 from the required General Civil Engineering Technology emphasis curriculum and to substitute in its place, existing course ETCE 3243.

The request to remove ETGR 3272 from the required General Civil Engineering Technology emphasis curriculum and to substitute in its place, existing course ETCE 3243 was approved by the chair of the Undergraduate Course and Curriculum Committee on November 6, 2003 for immediate implementation.

New catalog copy

Replace existing catalog copy on Page 127 under the General Civil Engineering Technology Emphasis with the following catalog copy:

Senior Year

ETCE 3212.....	Structural Steel Design.....	3
ETCE 3262	Intro to Environmental Engineering.....	3
ETCE 3243	Project Management Technology.....	3
CHEM 1251	Principles of Chemistry or GEOL 1200	
	Physical Geology (both with lab) (a).....	4
Directed Electives (b)		3
		16

cc: Dr. Gerald Ingalls
Dr. Anthony Brizendine

Mr. Bruce Gehrig

Mr. Stefanos Arethas

Mr. Richard Yount

Mr. Craig Fulton

Ms. Peggy Gordon

Advising Team

-

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: November 1, 2003

RE: Request to establish lower division Engineering Technology courses

The request to establish lower division Engineering Technology courses was approved by the Undergraduate Course and Curriculum Committee on October 17, 2003 and by Faculty Council on the October 20, 2003 Consent Calendar for immediate implementation.

New catalog copy

The Department of Engineering Technology proposes addition of the following lower division courses in support of the BSET undergraduate curriculum:

ETGR 1100, 1103, 1104, 1201, 2101, 2102, 2106, 2122; ETCE 1121, 1211, 1222, 2112, 2410 ; ETEE 1101, 1123, 1201, 1213, 1223, 2101, 2113, 2122, 2133, 2143, 2201, 2213, 2233, 2243; ETFS 1120, 1232, 1252, 2124, 2126, 2132, 2144, 2230, 2264, 2264L; ETME 1101, 2101, 2102, 2156, 2156L, 2202.

ETGR 1100. Engineering Technology Computer Applications. (3)

This course introduces the use of computer applications required for engineering technologists. Topics include using the computer to solve technical problems, an introduction to engineering computer applications, and the use of standard office applications in engineering applications. Also covered are topics introducing the use of scientific calculators and various engineering

applications software.

ETGR 1103. Technical Drawing I. (2)

This course deals with the fundamentals of technical drawing. Topics include drawing layouts, sketching, orthographic projections, views, lines, dimensioning techniques, and introduction to Computer Aided Drawing (CAD). Upon completion of the course, students should be able to understand, interpret, and produce basic technical drawings, as well as be familiar with the most common commands of modern computer aided drawing tools such as AutoCAD. One hour of Lecture and three hours of laboratory per week.

ETGR 1104. Technical Drawing II. (3)

This course introduces the student to advanced techniques of Computer Aided Drawing (CAD) using modern technical drawing software such as AutoCAD. Topics include dimensioning, isometric views, three-dimensional modeling, wireframe, and surface models. Upon completion of the course, students should be able to understand, interpret, and produce complex technical drawings using modern computer aided drawing tools such as AUTOCAD. Two hours or lecture and three hours of laboratory per week.

ETGR 1201. Introduction to Engineering Technology. (2)

An introduction to the different disciplines within engineering technology, the university computing system(s), personal and professional development, teamwork, project planning, communication skills, and conceptual design engineering within a multi-disciplinary format.

ETGR 2101. Applied Mechanics I (3)

Prerequisite: Math 1103. This course covers fundamentals and applications of statics. Topics of study include the analysis of coplanar and noncoplanar force systems using analytical and graphical methods. Included are systems of forces and couples, equilibrium of particles and rigid bodies, distributed force systems, centroids and moments of inertia, and introduction to the analysis of structures.

ETGR 2102. Applied Mechanics II. (3)

Prerequisite: ETGR 2101 Applied Mechanics I. This course covers the fundamentals of the mechanics of deformable bodies and introduces the student to the field of dynamics. Topics include concepts of stress and strain, axial load, statically indeterminate axially loaded members, the principle of superposition, torsion, bending and shear stresses in beams, deflection of beams, the elastic curve, transformation of stress and strain, Mohr's circle, introduction to stability and buckling of columns, and an introduction to dynamics.

ETGR 2106. Electrical Circuits. (3)

Prerequisite: MATH 1103. This course provides an introduction to AC and DC circuits. Simple series and series-parallel circuits will be used to illustrate applications of Ohm’s Law and

Kirchhoff's Laws. Power in DC resistive circuits will be discussed. Sine waves, complex numbers and phasors will be introduced to show their applications to analysis of AC circuits. Capacitors and inductors and their effects will be covered.

ETGR 2122. Technical Programming. (3)

This course introduces computer programming using the C programming language as related to engineering technology. Topics include input/output operations, sequence, selection, iteration, arithmetic operations, arrays tables, and pointers.

ETCE 1121. Construction Methods. (3)

An introduction to the basic construction methods and operations used on civil engineering projects. The course includes basic construction and civil engineering terminology, identification and selection of construction equipment and techniques, and an overview of the components and processes used in the construction of concrete, steel, and wood-framed structures.

ETCE 1211. Surveying I. (4)

An introduction course to field surveying and site planning. This course covers standards, units, and calibration of equipment, measurement of distance, elevation, angles, and analysis of systematic and random errors in the measurements, adjustments of measurements, weighting, and principle of least squares. The course includes three hours of lecture and/or up to three hours of laboratory per week.

ETCE 1222. Construction Materials. (3)

Prerequisite: ETCE 1121. Study of the behavior and physical properties of basic construction materials. Topics include mineral aggregates, Portland cement concrete, masonry, wood, asphalt concrete, metals, plastics, other materials. Two hours lecture and three hours laboratory.

ETCE 2112. Surveying II. (4)

Prerequisite: ETCE 1211 Surveying I. An intermediate surveying and site-planning course. This course covers plane survey, design and layout of horizontal and vertical curves, direction and

traversing, design of site plan, control of grading, and global positioning system. The course includes three hours of lecture and three hours of laboratory per week.

ETCE 2410. Introductory Environmental Engineering Technology. (3)
This course is designed to serve as an introduction to environmental engineering technology. The course will provide an overview of the environmental field to include laws and regulations, water quality, hydraulic and hydrologic fundamentals, water and wastewater treatment, groundwater contamination, and solid waste management.

ETEE 1101. Electronics Lab I. (1)

Prerequisite or corequisite: ETEE 1123. Experiments that support the concepts and practices covered in ETEE 1123. Three laboratory hours per week.

ETEE 1123. DC Circuit Analysis. (3)

Prerequisite or corequisite: MATH 1100. This course is an introduction to DC electricity with an emphasis on circuit analysis and measurements. Topics include DC principles, circuit analysis laws and theorems, components, test equipment operation, and circuit simulation software.

ETEE 1201. Electronics Lab II. (1)

Prerequisite or corequisite: ETEE 1223 and ETEE 1213. Experiments that support the concepts and practices covered in ETEE 1223 and ETEE 1213. Three laboratory hours per week.

ETEE 1213. Digital Circuits I. (3)

Prerequisite: ETEE 1123. An introductory course in digital concepts, number systems, logic gates, Boolean algebra and combinational logic. Introduction to logic programming. Introduction to digital circuit technologies.

ETEE 1223. AC Circuit Analysis. (3)

Prerequisite or corequisite: ETEE 1123 and MATH 1103. This course introduces AC electricity with an emphasis on circuit analysis, measurements, AC principles, circuit analysis laws and theorems, components, test equipment operation, and circuit simulation software.

ETEE 2101. Electronics Lab III. (1)
Prerequisite or corequisite: ETEE 2113**.** Experiments that support the concepts and practices covered in ETEE2113 (Electronic Devices): Introduction to semiconductor based devices with an emphasis on analysis, selection, biasing and applications in power supplies, small signal amplifiers, and switching and control circuits. Three laboratory hours per week.

ETEE 2113. Electronic Devices. (3)

Prerequisite: ETEE 1223 and MATH 1103. This course is an introduction to semiconductor-based devices such as diodes, bipolar transistors, FETs, thermistors, and related components. Emphasis is placed on analysis, selection, biasing, and applications in power supplies, small signal amplifiers, and switching and control circuits.

ETEE 2122. Electronic Drafting and Design. (3)

This course introduces computer-aided drafting (CAD) with an emphasis on applications in the electronics field. Topics include electronics industry standards (symbols, schematic diagrams, layouts); drawing electronic circuit diagrams; electronic drafting practices and components such as resistors, capacitors, and ICs. Topics include editing, screen capturing, and cutting/pasting into reports.

ETEE 2133. Digital Circuits II. (3)

Prerequisite or corequisite: ETEE 1213. Design and application of sequential circuits including flip-flops, counters, registers, and their interactions as state machines. Introduction to the architecture of microprocessors. Introduction to digital signal processing.

ETEE 2143. Introduction to Electrical Power Systems. (3)

Prerequisite: ETEE 1223. This course covers the basic principles of electric power systems, including transmission lines, generator and transformer characteristics, and fault detection and correction. Emphasis is placed on circuit performance analysis in regards to voltage regulation, power factor, and protection devices.

ETEE 2201. Electronics Lab IV. (1)

Prerequisite or corequisite: ETEE 2213. Experiments that support the concepts and practices covered in ETEE2213 (Introduction to Microprocessors): Introduction to microprocessor architecture and microcomputer systems including memory and input/output interfacing, assembly language programming, bus architecture, bus cycle types, I/O systems, memory systems, and interrupts.

ETEE 2213. Introduction to Microprocessors. (3)

Prerequisite: ETEE 1233. This course introduces microprocessor architecture and microcomputer systems including memory and input/output interfacing, assembly language programming, bus architecture, bus cycle types, I/O systems, memory systems, and interrupts.

ETEE 2233. Introduction to Computer Networks. (3)

Prerequisite: ETEE 1213. The fundamentals of local area networks and their operation in business and computer environments is covered, including the characteristics of network topologies, system hardware (repeaters, bridges, routers, gateways), system configuration, and installation and administration of the LAN.

ETEE 2243. Introduction to Control Systems. (3)

Prerequisite: ETEE 1233. The fundamental concepts of control, systems, sensors, actuator, and associated peripheral devices are covered, including rotating machine theory, ladder logic, electromechanical and solid state relays, motor controls, pilot devices, and PLC (programmable logic controllers), programming and networking.

ETFS 1120. Fundamentals of Fire Protection. (3)

This course is an introduction to the relevant issues one would encounter upon entering a career in fire protection. The course is an overview of many areas including fire protection career opportunities, history of public fire protection, general chemistry and physics of fire, codes and ordinances and fire protection systems and equipment.

ETFS 1232. Fire Protection Hydraulics and Water Supply. (3)

Provides a foundation of theoretical knowledge in order to understand the principles of the use of water in fire protection and to apply hydraulic principles to analyze and to solve water supply problems.

ETFS 1252. Fire Protection Law. (3)

Provides information about potential legal liabilities encountered every day by fire, safety and emergency personnel. Explains how to research, read and understand various statutes, regulations & cases. Actual cases are presented in detail and followed by explanations that identify the most important issues facing emergency & safety personnel.

ETFS 2124. Fundamentals of Fire Prevention. (3)

This class provides a fundamental overview of the history and philosophy regarding fire prevention. Class will investigate the organizational and operational aspects of a fire prevention bureau including the use of fire codes, identification and correction of fire hazards, and the relationships of fire prevention with built-in fire protections systems, fire investigation, and the positive effects of fire and life-safety

education

ETFS 2126. Fire Investigation. (3)

This course covers investigation into various types of fires: structure, wildland, automobile, fabric, and chemical. Topics include fire chemistry and physics, scene analysis, case analysis, arson, the new generation of petroleum products, post-flashover patterns of damage, misuse of post-fire indicators, and documentation.

ETFS 2132. Building Construction for Fire Protection. (3)

Studies the components of building construction that relate to fire and life safety. The focus of this course is on fire fighter safety. The elements of construction and design of structures are shown to be key factors when inspecting buildings, preplanning fire operations, and operating at emergencies.

ETFS 2144. Fire Protection Systems. (3)

Provides information relating to the features of design and operation of fire detection and alarm systems, heat and smoke control systems, special protection and sprinkler systems, water supply for fire protection and portable fire extinguishers.

ETFS 2230. Hazardous Materials. (3)

This course focuses on the basic knowledge required to evaluate the potential hazards and behavior of materials considered hazardous. The course examines the reasons for chemical behavior of hazardous materials and is designed to improve decision making abilities when hazardous materials are encountered in the workplace or at an emergency scene.

ETFS 2264. Fire Behavior and Combustion. (3)

Explores the theories and fundamentals of how and why fires start, spread, and are controlled.

ETFS 2264L. Fire Behavior and Combustion Laboratory. (1) Laboratory experiments and hands-on computer simulations to illustrate the concepts presented in ETFS 2264.

ETME 1101. Manufacturing Processes. (4)

This course surveys and introduces common manufacturing processes and design for manufacture considerations. Student will be introduced to methods and equipment used to transform materials, and to the interdependency between geometry (form), materials properties, and processes and their effects on functionality of the manufactured artifact. Coverage will include processing of polymers, metals, and ceramics. The purpose of this course is to provide the students the conceptual understanding of materials processes.

ETME 2101. Applied Materials. (4)

This course introduces the student to materials and to the concept that materials are designed to provide the desired properties in the same way that the parts themselves are designed. The students will learn to understand that the processes we use to change materials into the geometries we want for also change the properties of the materials. The course intends to approach materials from a design and manufacturing perspective.

ETME 2102. Mechanisms. (3)

Prerequisite: ETGR 1104, PHYS 1102. This course covers plane motion and devices used to generate plane motion. Topics include analysis of displacement, velocity, acceleration, gears, cams and other mechanical systems.

ETME 2156 Machine Shop Practices (2) and ETME 2156L Machine Shop Practices Lab (1) Prerequisites: ETME 1101, ETME 2101, ETME 1102. This course introduces students to machine shop techniques and designing for machining with a combination of lectures and

projects. Students will learn design for machining guidelines, about specification of machining operations, and about shop measurement instruments and techniques.

ETME 2202. Mechanical Drawing. (2)

This course is a continuation of ETGR 1103 & ETGR 1104. The primary focus is 3D parametric modeling of mechanical components and assemblies using Autodesk Mechanical Desktop software.

cc: Dr. Rick Lejk
Dr. Anthony Brizendine

Mr. Stefanos Arethas

Mr. Richard Yount

Mr. Craig Fulton

Ms. Carolyn Thigpen

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: November 1, 2003

RE: Request to establish ECGR 6266/ECGR 8266: Neural Networks Theory and Design

The request to establish ECGR 6266/ECGR 8266: Neural Networks Theory and Design was approved by the Graduate Council on September 16, 2003 and by Faculty Council on the October 20, 2003 Consent Calendar for immediate implementation.

New catalog copy

ECGR 6266 Neural Networks Theory and Design (3).

Topics include: Neural network model and network architectures; single layers, multiple layers network, perceptron learning rules ; supervised hebbian learning; performance optimization; widrow hoff learning ; backpropagation ; associative learning ; competitive learning ; grossberg network ; hopfield network; application of neural network (On demand).

ECGR 8266 Neural Networks Theory and Design (3).

Topics include: Neural network model and network architectures; single, and multiple layers network, perceptron; applications; supervised hebbian learning; performance optimization; widrow hoff learning; applications; backpropagation; applications; associative learning ; competitive learning; applications; grossberg network ; hopfield network; application of neural network in control systems (On demand).

cc: Dr. Gerald Ingalls
Dr. Farid Tranjan

Mr. Stefanos Arethas

Mr. Richard Yount

Mr. Craig Fulton

Ms. Carolyn Thigpen

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: November 1, 2003

RE: Request to establish ECGR 6437: Mixed-Signal IC Design

The request to establish ECGR 6437: Mixed-Signal IC Design was approved by the Graduate Council on September 16, 2003 and by Faculty Council on the October 20, 2003 Consent Calendar for immediate implementation.

New catalog copy

ECGR 6437. Mixed-Signal IC Design (3). Prerequisites: permission of the department. Design and analysis of mixed-signal integrated circuits and systems including amplifiers, digital circuits, analog-to-digital-converters, voltage-controlled oscillators, integrated circuit layout, simulation, and fabrication using modern CAD tools. Students are expected to design, fabricate, and test a mixed-signal integrated circuit. *(Fall)*

cc: Dr. Gerald Ingalls
Dr. Farid Tranjan

Mr. Stefanos Arethas

Mr. Richard Yount

Mr. Craig Fulton

Ms. Carolyn Thigpen

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: April 25, 2003

RE: Request to establish a new graduate course, ECGR 6264: Radio Frequency Design

The request to establish a new graduate course, ECGR 6264: Radio Frequency Design was approved by the Graduate Council April 7, 2003 and by Faculty Council on the April 10, 2003 Consent Calendar for immediate implementation.

New catalog copy:

ECGR 6264. Radio Frequency Design. (3)
Prerequisites: permission of department. Design and analysis of radio frequency circuits and systems including S-parameters, impedance matching, noise, intermodulation distortion, image rejection, cascade analysis, and incorporation of these methods in the design of modern radio receivers and transmitters. Lecture. *(Spring)*

cc: Dr. Gerald Ingalls

Dr. Farid Tranjan

Mr. Brian Bradley

Mr. Richard Yount

Mr. Craig Fulton

Ms. Carolyn Thigpen

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Sanders

Director of Assessment and Faculty Governance

DATE: April 25, 2003

RE: Request to establish a new graduate course, ECGR 6265/8265: Neural Networks and Fuzzy Logic

The request to establish a new graduate course, ECGR 6265/8265: Neural Networks and Fuzzy Logic was approved by the Graduate Council April 7, 2003 and by Faculty Council on the April 10, 2003 Consent Calendar for immediate implementation.

New catalog copy:

ECGR 6265/8265. Neural Networks and Fuzzy Logic. (3)
Topics include: Fuzzy sets, fuzzy logic, fuzzy logic control systems, applications of neural networks, structure adaptive neural network, applications, fuzzy integrated systems, neural networks based fuzzy systems, applications, neural fuzzy controllers, applications in control systems. *(On demand)*

cc: Dr. Gerald Ingalls

Dr. Farid Tranjan

Mr. Brian Bradley

Mr. Richard Yount

Mr. Craig Fulton

Ms. Carolyn Thigpen

Advising Team

MEMORANDUM

TO: Dean Robert Johnson

The William States Lee College of Engineering

FROM: Cathy Outland

Director of Assessment and Faculty Governance

DATE: March 3, 2003

RE: Request to establish ECGR 6120/8120: Wireless Communication and Networking

The request to establish ECGR 6120/8120: Wireless Communication and Networking was approved by the Graduate Council on February 4, 2003 and by the Faculty Council on the February 13, 2003 Consent Calendar. It is approved for immediate implementation.

Catalog Copy:

ECGR 6120/8120. Wireless Communication and Networking. (3)

Prerequisites: ECGR 3123, ECGR 4123, graduate standing, or permission of the department. The cellular concept: interference issues, cell layout and planning, control techniques, grade-of-service and system capacity; characteristics of the mobile radio channel and channel models; multiple access techniques in wireless: FDMA, TDMA, and CDMA; analog and digital cellular telephone standards; packet radio systems: description, medium access control, and routing issues. *(Spring)*

cc: Dr. Gerald Ingalls

Dr. Farid M. Tranjan

Dr. Asis Nasipuri

Mr. Brian Bradley

Mr. Richard Yount

Mr. Craig Fulton

Ms. Carolyn Thigpen

Advising Team