1. Catalog Description:
   AET 2184 - Electronic Circuits and Semiconductor Concepts (2-4-4) S. Short title: Elec. Circuits. An investigation of basic electrical/electronic circuits including: simple DC circuits and theorems; AC circuit variables and components; semiconductor theory, devices and circuits; and an introduction to integrated circuits. Prerequisite: AET 2324 and MAT 1271.

2. Objectives of the Course:
   The student will:
   
   (1) be able to use available instrumentation and follow appropriate procedures to measure and record various electrical properties.
   
   (2) be able to explain the theories and operation of semiconductor materials, and common semiconductor devices.
   
   (3) experiment with solid state amplifiers components and construct electronic circuits to operate as linear amplifiers and switching devices/circuits.
   
   (4) study the theory and application of optical solid-state devices, be able to explain the applications of optic devices, and calculate circuit parameters for implementing optical devices.
   
   (5) investigate the theory and application of Integrated Circuits, (specifically operational amplifiers and industrial timing circuits) and be able to implement the necessary components to construct/use linear amplifiers, comparators, and basic timing circuits.

3. Outline of the Course:

   1. Complex Electrical Circuits and Electronic Test Equipment 5 weeks
      A. DC Circuit Concepts
         1. Complex circuits
            a. voltage, current, impedance, and power in complex circuits
            b. Thevenin's equivalent circuits
            c. Kirchhoff's current and voltage laws
         2. Measuring DC circuit variables
      B. AC Circuit Concepts
         1. Inductance
         2. Capacitance
         3. Resonant circuits
            voltage, current, impedance, and power in AC circuits
         4. Measuring DC circuit variables

   2. Semiconductor Theory 4 weeks
      A. Diodes
         1. Rectifier diodes
         2. Zener diodes
         3. Signal diodes
      B. Transistors
         1. Bipolar transistors
         2. Field effect transistors
3. Transistor Circuits  
   A. Amplifiers  
      1. Circuit configurations  
      2. Circuit gain  
      3. Input and output impedances  
      4. Power amplifiers  
   B. Transistors as Switches  

4. Integrated Circuits and Optical Devices  
   A. Linear Integrated Circuits  
      1. Operational amplifiers  
      2. Timing ICs  
   B. Optical Couplers and Isolators  

Evaluation: Student evaluation will consist of: unit exams, quizzes, a written research report, and evaluation of completeness and accuracy of assigned laboratory activities.

4. Implementation:  
   a) Faculty member(s) to whom the course may be assigned:  
      Dr. John M. Messer  
   b) Additional costs to students:  
      $10 materials fee (Materials fee previously approved by President's Council.)  
   c) Text and supplementary materials  
   d) Term to be first offered.  
      Spring 2001  

5. Rationale:  
   a) Purpose and need  
      A study of basic electronic circuits, semiconductors, integrated circuits, and typical circuit applications is essential for an understanding of electronic control circuitry. With the demands on industry for increased productivity and higher quality, and more affordable automation and control systems available, industry is implementing automation and control systems at an ever increasing rate. To be successful as technical managers, graduates entering the industrial sector of the economy must have a working knowledge of automation and control concepts.  
   b) Justification of the level of the course and a list of all prerequisites.  
      The course content builds on an understanding of DC circuits, and the control concepts to be taught as part of AET 2324 - Electronic control systems. Prerequisites for the course are AET 2324 and MAT 1271.  
   c) Similarity to existing courses and/or effect upon programs in other departments.  
      (1) Justification for the new course if it is similar to an existing course.  
         Proposal is to revise course content.  
      (2) Course(s) to be deleted or the exceptional need to be met  
         none
The Electronics concentration in the Applied Engineering & Technology program will be renamed Automation and Control to better reflect the need of Applied Engineering & Technology graduates.

d) Requirement or elective.
   Course will count toward the Automation and Control concentration for the Applied Engineering & Technology degree.

6. Community College Transfer:
   Comparable community college transfer course would be considered equivalent.

7. Date approved by the School of Technology Curriculum Committee: February 3, 2000

8. Date approved by the Lumpkin College of Business and Applied Sciences Curriculum Committee: March 28, 2000

9. Date approved by CAA: April 20, 2000