<u>OUTLINE OF TOPICS TO BE COVERED</u>

Introduction

Electric Circuits (6 weeks)
- o Circuit Variables
- o Circuit Elements
- o Kirchhoff's Laws
- o Simple Resistive Circuits
- o Circuit Analysis Techniques
  - ▪ Nodal analysis
  - ▪ Loop/mesh analysis
  - ▪ Equivalent circuits
- o Active Circuits
  - ▪ Dependent sources
  - ▪ Amplifiers
  - ▪ Operational amplifier
  - ▪ Feedback
- o Time-Varying Signals in Circuit Analysis
  - ▪ Inductance and capacitance
  - ▪ Transient response of first-order (RL and RC) circuits

Active Devices and Circuits (4 weeks)
- o Semiconductors
- o pn Junction Diode
- o Field-Effect Transistors
- o Microfabrication Technology
- o CMOS Fabrication Process
- o Transistor Amplifying Circuits
  - ▪ Transistor biasing
  - ▪ Small-signal transistor model
  - ▪ Basic amplifier circuit

Digital Integrated Circuits (3 weeks)
- o Digital Signals and their Applications
- o Logic Blocks and Flip Flops
- o CMOS Logic Gates
  - ▪ Design and layout
- o Gate Delay Analysis
- o Power Analysis
- o Interconnect Model and Delay
- o Fanout and Capacitive Coupling