**Topical Outline (tentative)**

1. **The Physics of Electrical Conduction**

Text reading: Sections 1.1 – 1.6, 2.1 – 2.11 of Jaeger

1. Single Carrier Conduction
2. Metals and Insulators
3. Conductivity and Resistivity
4. Electronic Density and Mobility
5. Semiconductors and Energy Bands
6. Electrons and Holes
7. Donors and Acceptors
8. Equilibrium Carrier Concentrations
9. Conduction Processes in Semiconductors
10. Electric Field Drift Diffusion Generation and Recombination
11. Injection
12. Effects at Junctions
13. Junction Boundary Conditions
14. Diffusion Currents
15. Charge Storage and Capacitance
16. **Semiconductor Diodes**

Text reading: Sections 3.1 – 3.19 of Jaeger

1. Construction and Characteristics
2. pn-Junction Structure and Definitions
3. I-V Characteristics and Regions of Operation
4. Ratings, Specifications, and Parameters
5. Circuit Models
6. Ideal Diode
7. Linearized Diode
8. Shockley Diode Equation
9. Circuit Analysis
10. Nonlinear Elements in Linear RLC Circuits
11. Determining the Device State
12. Voltage Transfer Characteristics
13. Analysis Using SPICE
14. Applications and Design
15. Rectifiers
16. Zener Diodes
17. Clippers and Clampers
18. LEDs and Photodiodes
19. **Field-Effect Transistors**

Text reading: Sections 4.1 – 4.13 of Jaeger

1. Construction and Characteristics
2. n-Channel and p-Channel JFETs
3. n-Channel and p-Channel MOSFETs
4. Enhancement and Depletion Mode Devices
5. I-V Characteristics and Regions of Operation
6. Ratings, Specifications, and Parameters
7. Circuit Models
8. Ideal FETs
9. Linearized FETs
10. Shickman-Hodges FET Equations
11. Circuit Analysis
12. Determining the Device State
13. Voltage Transfer Characteristics
14. Analysis Using SPICE
15. Applications and Design
16. Controlling Higher Power Loads
17. Complementary Designs
18. Memory Cells
19. **Digital Logic Families**

Text reading: Sections 6.1 – 6.5, 7.1 – 7.12, 8.1 – 8.10, 9.1 – 9.9 of Jaeger

1. Characteristics and Parameters
2. Output High and Low Voltages
3. Input High and Low Voltages
4. Noise Margins
5. Fan-Out and Fan-In
6. Power-Delay Product
7. nMOS and pMOS Logic
8. Resistor Loads
9. Saturated e-Mode Load
10. Nonsaturated E-mode Load
11. Depletion Mode Load
12. CMOS Logic
13. Inverter Characteristics
14. NAND and NOR primitives
15. Transmission Gates
16. Bistable Circuits