1. ECE 4200: Power Electronics
2. Credit Hours: 3; Contact Hours: 3
3. Johnson Asumadu, PhD, Professor
   1. ECE 4200 Lecture Notes, 2016, Asumadu
   4. SPICE Software
   5. Scientific Calculator
5. Course Information
   1. Analysis and design of industrial electronic systems, power sources, motor controls, timing and sequencing circuits.
   2. Prerequisites: ECE 2500, ECE 3200, and ECE 3300
   3. Required
6. Course Goals:
   1. ABET student outcome assigned to this course according to ECE Assessment Plan: c and i.
   2. Use electronics and solid-state power devices for the control, conversion, and protection of electrical energy. (a, b, c, d, e, i, k)
   3. Ability to design switching using power semiconductor devices. (a, b, c, e, i, k)
   4. Apply control techniques to meet desired switching objectives. (b, c, e, i, k)
   5. Integrate signal processing strategies into the control concepts. (a, b, c, d, e, i, k)
   6. Ability to specify design criteria (power, efficiency, ripple voltage and current, harmonic distortions, power factor). (a, b, c, d, e, i, k)
   7. Ability to select components, interpret terminal characteristics of the components, model components, design circuit, and understanding operation of power electronics circuits. (c, d, e, i, k)
   8. Use application software (PSPICE, MATLAB, MATHCAD) for simulating circuits with power semiconductor devices, motor drives, and different loading conditions. (a, b, c, d, e, i, k)
7. Course Topics
   1. Switching Semiconductor Devices, Diodes, Transistors, Thyristors, Power Considerations Harmonics (6 Classes)
   2. AC-DC Rectifiers – Diodes Circuits, Single-phase and Three-phase (6 Classes)
   3. AC-DC Controlled Rectifiers – Thyristor Circuits, Single-phase and Three-phase Natural and Forced Commutations (8 Classes)
   4. DC-AC Inverters Single-phase and Three-phase PWM Inverters (6 Classes)
   5. DC-DC Switch-Mode Converters Buck, Boost, Buck-Boost, Cuk, Chopper Circuits (6 Classes)
   6. AC-AC Converters- Cycloconverters – Single-phase, Three-phase (4 Classes)
   7. Applications – Motor Controls, Power Supplies (6 Classes)
   8. Tests (3 Classes)