

**ELEI 206**  
**D.C. MOTOR THEORY AND CONTROLS**  
**3 Semester Hours**

**The Community College of Baltimore County**

**Description**

**D.C. Motor Theory and Controls**

Studies the theory and operation of D.C. motors and generators and components/systems used to control the operation of D.C. motors; explains the principles of motor and generator action, series field, shunt field, and compound field. Two hours of lecture and two hours of lab a week for one semester.

Prerequisite: MATH 108, ELEI 106, ELEN 111 Solid State Devices or consent of the instructor

**Overall Course Objectives**

Upon completion of this course the student will be able to:

Explain the construction of D.C. Generators and D.C. Motors. Identify the different types D.C. Generators and Motors and demonstrate an understanding of their different operating characteristics. Understand the principles of voltage generation as well as the principles of motor action. Demonstrate in a lab environment the operation of a D.C. Generator and the operation of various types of D.C. Motors. Be able to describe the common methods of controlling the output voltage of a generator. Identify the three most common methods of D.C. Motor speed control. Know the equivalent circuit of a motor and the motor equations. Be able to calculate the values of resistance for starting D.C. Motors based on the per unit (PU) current value. Be able to calculate speed, torque, horsepower, and C.E.M.F.

**Major Topics**

D.C. Generator construction, Armature, commutator, shunt fields, series field, inter-poles or commutating poles, brushes and brush rigging. Principles of D.C. Generation, the generator formula, the hand rule for generators. Conversion of mechanical energy into electrical energy. D.C. Motor construction, Armature, series field, shunt field, commutating or interpoles, brushes and brush rigging. Types of motors, series, shunt, compound, cumulative vs. differential compound. Operating characteristics, Neutral plane, commutation process, cross-magnetization and de-magnetization effects on neutral plane. Brush maintenance, commutator film, maintaining the commutator film, factors effecting brush wear. Principles of D.C. motor control, starting methods, three point and four point starting schemes, methods of speed control, armature voltage, armature current, and armature resistance. LVP and LVR circuits, circuit breakers, time-delay fuses and other protective devices.

**Course Requirements**

The instructor will administer three exams (60%), Lab projects (30%), assignments (10%).

**Other Course Information**

**Additional Information about this course or any other Industrial electricity/electronic course can be obtained by contacting the IEE/Telecommunications Program Director.**