**Course Overview**

**Duration**: 12 weeks  
**Structure**: 2 hours of lectures and 2 hours of lab work per week  
**Prerequisites**: Basic knowledge of physics (electricity and magnetism) recommended but not required  
**Objective**: Introduce students to industrial motors, covering principles, components, types, applications, and maintenance through lectures, labs, and projects.

**Weekly Outline**

**Week 1: What Are Industrial Motors?**

* **Trainer**: Definition and role of industrial motors in powering machinery (pumps, fans, conveyors, compressors).
* **Lab**: Explore motor applications using models or videos (e.g., conveyor or pump systems).
* **Objectives**: Define industrial motors; explain their role in industrial efficiency.
* **Assessment**: Quiz; lab participation.

**Week 2: Types of Industrial Motors - Part 1 (AC and DC Motors)**

* **Trainer**: AC motors (reliable, factory use) and DC motors (variable speed applications).
* **Lab**: Examine AC and DC motor models; compare designs.
* **Objectives**: Identify AC and DC motor characteristics; describe their applications.
* **Assessment**: Quiz; lab report.

**Week 3: Types of Industrial Motors - Part 2 (Servo and Stepper Motors)**

* **Trainer**: Servo motors (precise control, e.g., robotics) and stepper motors (positioning, e.g., CNC machines).
* **Lab**: Operate stepper motor; explore servo control.
* **Objectives**: Explain servo and stepper motor features; identify precision applications.
* **Assessment**: Quiz; lab participation.

**Week 4: How Electric Motors Work - Electromagnetic Principles**

* **Trainer**: Electromagnetism; magnetic fields from current create rotational force.
* **Lab**: Build simple electromagnet to observe field interactions.
* **Objectives**: Describe electromagnetic induction; explain rotational motion.
* **Assessment**: Quiz; lab report.

**Week 5: Motor Components - Stator and Rotor**

* **Trainer**: Stator (generates magnetic field) and rotor (drives shaft).
* **Lab**: Disassemble motor to identify stator and rotor.
* **Objectives**: Describe stator and rotor functions in motion creation.
* **Assessment**: Quiz; lab participation.

**Week 6: Motor Components - Windings and Bearings**

* **Trainer**: Windings (create magnetic fields) and bearings (reduce friction).
* **Lab**: Inspect windings and bearings in motor models.
* **Objectives**: Explain windings’ role in field generation; describe bearings’ support function.
* **Assessment**: Quiz; lab report.

**Week 7: Motor Components - Commutator and Brushes (DC Motors)**

* **Trainer**: Commutator and brushes in DC motors; current switching for rotation.
* **Lab**: Examine DC motor commutator and brushes; test current flow.
* **Objectives**: Analyze commutator’s current switching; explain brushes’ role.
* **Assessment**: Quiz; lab participation.

**Week 8: Motor Operation - AC and DC Motor Mechanics**

* **Trainer**: AC motors (rotating magnetic fields) vs. DC motors (commutator/controllers).
* **Lab**: Operate AC and DC motors; compare performance.
* **Objectives**: Describe AC and DC motor mechanics; analyze torque production.
* **Assessment**: Quiz; lab report.

**Week 9: Applications of Industrial Motors**

* **Trainer**: Motor uses in manufacturing, HVAC, agriculture, construction, mining/oil.
* **Lab**: Analyse motor use in industrial case study (e.g., conveyor system).
* **Objectives**: Identify motor applications; explain motor type selection.
* **Assessment**: Quiz; group discussion.

**Week 10: Motor Maintenance - Preventive Care**

* **Trainer**: Inspection, lubrication, vibration/noise checks for motor longevity.
* **Lab**: Perform mock motor inspection (bearings, connections).
* **Objectives**: Describe preventive maintenance; explain performance benefits.
* **Assessment**: Quiz; lab report.

**Week 11: Motor Maintenance - Troubleshooting**

* **Trainer**: Common issues (overheating, failure to start, noise); troubleshooting methods.
* **Lab**: Diagnose simulated motor faults (e.g., worn bearings).
* **Objectives**: Identify motor problems; apply troubleshooting techniques.
* **Assessment**: Quiz; lab report.

**Week 12: Capstone Project and Course Review**

* **Trainer**: Review principles, components, types, applications, maintenance; project guidelines.
* **Lab**: Build/test DC motor prototype; present findings.
* **Objectives**: Synthesize concepts; design/test prototype.
* **Assessment**: Capstone project (prototype, report, presentation); final exam; participation.

**Assessment Summary**

* **Quizzes**: 30% (weekly, topic-specific)
* **Hands-On Projects**: 70% (lab reports, capstone project)
* **Final Exam**: 100% (comprehensive, theoretical/practical)
* **Class Participation**: 10% (lectures, labs, discussions)

**Course Facilitators**

* + **Mr. Wambui Kevin, Lead Trainer**
    - Diploma in Electrical Engineering; 10 years in motor design.
    - Role: Lectures, discussions, project oversight.
    - Contact: wambuik381@gmail.com
  + **Mr. Victor Moranga, Lab Coordinator**
    - Diploma in Mechanical Engineering; 5 years in motor manufacturing.
    - Role: Lab management, motor assembly demos, project support.
    - Contact: victormoranga@gmail.com