

**Wollo University**  
**Kombolcha Institute of Technology**  
**Department of Electrical and Computer Engineering**

**Introduction to Electrical machine Course Outline**

|                       |                                             |                                |                         |
|-----------------------|---------------------------------------------|--------------------------------|-------------------------|
| <b>Course Title:</b>  | Introduction to Electrical machines         | <b>Instructor:</b>             | Asefa S.                |
| <b>Course Number:</b> | ECEg3131                                    | <b>Contact Hrs (per weak):</b> | 7                       |
| <b>ECTS Credits:</b>  | 5                                           | <b>Pre-requisites:</b>         | Electromagnetic Fields  |
| <b>Semester:</b>      | I                                           | <b>Academic year:</b>          | 2018/2019 G.C(2011 E.C) |
| <b>Year:</b>          | 3 <sup>rd</sup> Electrical and Computer Eng | <b>Email:</b>                  | asefasisay581@gmail.com |
| <b>Target group:</b>  | 3 <sup>rd</sup> year Electrical             |                                |                         |

**Course Description**

Magnetism; Transformers; 3-Phase Induction Machines; D.C Machines; Synchronous Machines

**Course Objectives**

- ✓ To understand basic concepts of electromagnetic circuits as they relate to voltages, currents, and physical forces induced in conductors.
- ✓ To understand and gain insight into principles of operation & construction of transformer, induction machines, D.C. machines, and synchronous machines.
- ✓ To learn and understand analytical models for transformers and electrical rotating machines.
- ✓ To use models to analyze power requirements, power capability, efficiency and operating characteristics.

**Course contents**

- 1. Magnetism:** Field properties, materials, saturation & hysteresis, magnetic circuits, iron losses, Production of an EMF, Production of electromagnetic force-torque.
- 2. Transformers:** Principle of action, construction, ideal & practical models, 3-phase transformers connections.
- 3. 3-Phase Induction Machines:** Revolving field, construction, synchronous speed & slip, parameter measurement.
- 4. D.C Machines:** Construction, armature reaction, commutation, Characteristics of Dc generator
- 5. Synchronous Machines:** Construction, equivalent circuit, parameter testing

**Teaching methods:** - lecture; tutorials

**Assessment Methods:** Continuous Assessment (50%), Final examination (50%)

**Course policy:**

- ✓ All students are expected to abide by the code of conduct of students throughout this course.
- ✓ Academic dishonesty, including cheating, fabrication, and plagiarism will not be tolerated.
- ✓ Students are required to submit and present the assignments provided according to the time table indicated.
- ✓ 75% of class attendance is mandatory! Please try to be on time for class. Students will not allow entering if late more than five minutes.
- ✓ Active participation in class is essential.
- ✓ Cell phones MUST be turned off before entering the class.

**References:**

1. J. Hindmarsh: Electrical Machines and their Applications
2. Kosow: Electric Machinery and Control, Prentice-Hall
3. Siskind: Electrical Machines, McGraw-Hill
4. Chapman: Electric Machinery Fundamentals, McGraw-Hill

5. Fitzgerald, C. Kingsley, & S. D. Umans: Electric Machinery
6. M.G. Say: Alternating Current Machines