Department Mechanical Engineering
College of engineering and Technology

Bule Hora University

Course Number	**MEng3261**			
Course Title	**Instrumentation and Measurement**			
Program	**BSc in Mechanical Engineering**			
Module				
Module Coordinator				
Lecturers **Contact address**	Amtataw A. (G-1) amtatawashko@gmail.com			
	Gamechis M. (G-2) Gamechis@gmail.com			
	Dereje A. (G-3) Dereman79@gmail.com			
ECTS Credits				
Contact Hours	**Lecture**	**Tutorial**	**Practice or Laboratory**	**Home study**
	32	0	48	28
Course Objectives:	This course has the objective of acquainting the student with operating principles and function of measuring instruments used in Mechanical Engineering education. At the end of the course, the student will be able: • To understand electrical transducers for measuring force, displacement, velocity, temperature, etc. • To use temperature, velocity, flow, force, acceleration, current, voltage measuring instruments • To calibrate instruments • To conduct simple experiments			
Course Description:	Measurement error analysis; Transducers and their response, active and passive transducers; Signal conditioning. Transducers and measurement systems for: Displacement, velocity, acceleration, torque, pressure, fluid velocity, flow rate, temperature, flue-gas composition, and radiation; Data transmission, processing, display and recording;			
Course Outline:	**1. Measurement Error Analysis** **2. Transducers and their response, active and passive transducers;** **3. Signal conditioning;** 4. **Transducers and measurement systems**: Current and voltage measurement; Displacement; Stain measurement; Pressure measurement; Temperature measurement; Flow measurement; Rotational speed measurement; Velocity and acceleration measurement			

	5. **Data transmission and processing**: Introduction to display and recording;
Laboratory Exercises	1. Displacement measurements with inductive and capacitive sensors 2. Fluid velocity measurement 3. Flow rate measurement 4. Viscosity measurement 5. Thermocouple 6. Heating value measurement 7. Stress and stain measurement with strain gauges **8.** Torque measurement
Pre-requisites:	Thermodynamics II, Fluid Mechanics II ,Strength of Materials II
Semester:	6th
Teaching and Learning methods	• Lectures, • Demonstrations, and • Laboratory exercises.
Assessment/ evaluation & Grading Systems	Assessment/ evaluation and Grading system • Laboratory Exercises 50%, • Final Examination 50%.
Attendance Requirement:	Attendance Requirement: • Minimum of 80% attendance during lecture hours; and • 100% attendance during practical laboratory sessions, except for some unprecedented mishaps.
Literature:	Textbook: Gosh, A.K., Introduction to Measurement and Control, 2000.
	References: 1. Golding and Widdis, Electrical Measurement and Measuring Instruments 5th Ed., 1999 2. Nakra, B.C. and Chaudhry, K.K.: Instrumentation Measurement and Analysis, 1985