Course Code	TKEE162205
Course Name	Measurement and Instrumentation
Course Instructors	Harry Prabowo, Oyas Wahyunggoro, Priyatmadi,
Course Type	Required
Course Classification	Engineering Topics
Credit / Contact Hour per Week	2 / 100 minutes per Week
Course Description	This course discusses about measurement and measuring devices, specifications and characteristics of measuring device, analog and digital instruments, non electrical instruments, control devices, PLC and DCS, and industrial instrument standards.
Prerequisites Courses	
Covered Student Outcome	**Development of Engineering Solution (b)** **Engineering Design (c)** **Data and Experiment (d)**

Learning Outcome	1. Students are able to explain the measurement and its specifications, errors and their overcomings, measurement methods classification, measurement standards and units, and measurement statistical analysis. 2. Students are able to explain the principle of electrical measuring device and its charactreristics, mention and explain analog electrical instruments and their extensions, and perform the measurement of electrical quantities. 3. Students are able to explain the principle of electronic instrument, compare the types of eletronic instruments, understand the principle of DAQ, compare the types of DAQ, and perform the digital measurement of electrical quantities. 4. Students are able to explain the use of sensors, properties and preferred properties of sensors, methods to get the preferred properties of sensors, sensor classifications, sensors and extended sensors, sensor applications, and signal conditioners. 5. Students are able to design piping & instrumentation diagram covering equipment such as transmitter; controller; electrical, pneumatic, and Hydraulic equipment; PLC and DCS programming, and final control element.
Topic	1. Measurement and Error, Measurement Classifications 2. Unit System, Standard and Measuremet Statistics 3. Analog Electrical Instruments and Characteristics 4. Instruments and Analog Electrical Measurement 5. DAQ 6. DVM, DMM, and Digital Electrical Measurement 7. Non-Electrical Measurement 1 8. Non-Electrical Measurement 2 9. Instrumentation symbol dan Piping and Instrumentation Diagram 10. Analog Controllers, Electronic and Pneumatic 11. PLC and DCS 12. Final Control Element
Direct Asessment	

Direct Asessment Plan	**Measured Learning Outcome**
Homework	LO1-5
Mid Exam	LO1,LO2,LO3
Final Exam	LO4,:LO5

Indirect Assesment	Questionnaire (EDOM)
References	[1] Morris, Alan S. 2001. Measurement and Instrumentation Principles. Third Edition. Butterworth Heinemann. Oxford. [2] Cooper, W.D. 1978. Electronic Instrumentation and Measurement Techniques. Second Edition. Prentice-Hall of India Private Limited. New Delhi-110001. [3] Gupta, J.B. 1979. A course in Electrical Measurements and Measuring

	Instruments. Fourth Edition. Katson Publishing House. [4] Johnson, Curtis. 1993. Process Control Instrumentation Technology. Fourth edition. Prentice Hall International, Inc. Englewood Cliffs. New Jersey. [5] Prijadi, Ipieng. Teknik Pengukuran-I&II. Naskah Departemen untuk Taruna Akademi Militer Tingkat : II HUB. [6] Doebelin, Ernest O. Measurement Systems, Application and Design. Fifth Edition. Mc Graw Hill. Singapore. 2004. [7] Young & Freedman, 2000, University Physics, Addison-Wesley Publishing Co. [8] Web