TKB212203

Biomedical Measurement and Instrumentation

Pengukuran dan Instrumentasi Biomedis

BASIC INFORMATION

Course Credit	2 / 100 minutes per Week
Course Type	Required
Course Classification	Engineering Topics
Prerequisites	-

STUDENT AND LEARNING OUTCOMES

Covered Student Outcomes

Development of Engineering Solution (KP.2) Engineering Design (KP.3)

Data and Experiments (KP.4)

Learning Outcomes

LO1 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.

LO2 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.

LO3 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.

LO4 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.

LO5 Students are able to design piping & instrumentation diagram covering equipment such as transmitter; controller; electrical, pneumatic, and Hydraulic.

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.

TOPICS

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

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 2 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.