



Measurement Science

Prof. Mannan Saeed Muhammad,SKKU

SHORT COURSE DESCRIPTION

The course is designed to introduce students about measurement and instrumentation used in all fields of engineering. The course introduces the process of associating numbers with physical quantities and phenomenon. A measurement system can be interpreted as a channel for transporting information from a measurement object to a target object. In a measurement-and-control system (part of) the target object is identical to the measurement object. Three main functions can be distinguished—data acquisition, data processing, and data distribution. Data acquisition is used to obtain information about the measurement object and convert it into an electrical signal. Data processing includes processing, selecting, or otherwise manipulating measurement data in a prescribed manner. Data distribution is used to supply processed data to the target object. Multiple outputs indicate the possible presence of several target instruments such as a series of control valves in a process installation. Rapid growth in computers and computer science has contributed to an expansion of software tools for the processing of measurement signals and the computer is gradually taking over more and more instrumental functions.

The case studies are drawn from the fields of electrical and mechanical engineering, control systems, and, satellite and car navigation technologies, and offer a broad variety of applications for all users.

READING MATERIALS

The following text book is recommended to assist your learning with this course:

- Ronald W. Potter, “The Art of Measurement, Theory and Practice”, Printice Hall PTR, Upper Saddle River, New Jersey, 2000. ISBN 0-13-026174-2. 2-183
- “Measurement Engineering Handbook” Myer Kutz, Volume 1 and 2, Wiley, 2015, ISBN 9781118446959.

COURSE REQUIREMENTS AND GRADING

Student academic achievement evaluated by grades on a scale of 100 points

Grade of 60 or above is Pass.

SKKU regulations require students to attend at least 80% of all classes.

Grading Percentages

Attendance:	10%
Quiz:	20%
Assignments:	20%
Final Exam:	50%

COURSE SCHEDULE

The course includes the following topics:

1. Introduction to Basics of Measurement
 2. Design of measurement model
 3. Measurement Errors and Uncertainty
 4. Measurements as random variables.
 5. Estimating Parameter Values and Estimation theory
 6. Analog Signal Conditioning
 7. Digital Signal Conditioning
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8. Analog to Digital and Digital to Analog Conversion
 9. Measurement of Electrical, Thermal and Optical Quantities
 10. Measurement of Mechanical Quantities
 11. Measurement of Chemical Quantities
 12. Imaging Instruments
 13. Design of Measurement Systems
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