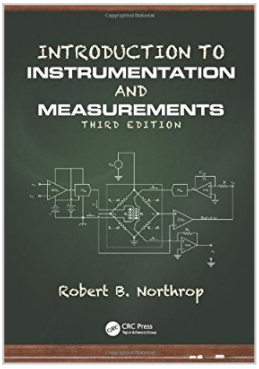


# Introduction to Instrumentation and Measurements, Third Edition

*By Robert B. Northrop*

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Weighing in on the growth of innovative technologies, the adoption of new standards, and the lack of educational development as it relates to current and emerging applications, the third edition of **Introduction to Instrumentation and Measurements** uses the authors' 40 years of teaching experience to expound on the theory, science, and art of modern instrumentation and measurements (I&M).

What's New in This Edition:

This edition includes material on modern integrated circuit (IC) and photonic sensors, micro-electro-mechanical (MEM) and nano-electro-mechanical (NEM) sensors, chemical and radiation sensors, signal conditioning, noise, data interfaces, and basic digital signal processing (DSP), and upgrades every chapter with the latest advancements. It contains new material on the designs of micro-electro-mechanical (MEMS) sensors, adds two new chapters on wireless instrumentation and microsensors, and incorporates extensive biomedical examples and problems.

Containing 13 chapters, this third edition:

- Describes sensor dynamics, signal conditioning, and data display and storage
- Focuses on means of conditioning the analog outputs of various sensors
- Considers noise and coherent interference in measurements in depth
- Covers the traditional topics of DC null methods of measurement and AC null measurements
- Examines Wheatstone and Kelvin bridges and potentiometers
- Explores the major AC bridges used to measure inductance, Q, capacitance, and D
- Presents a survey of sensor mechanisms
- Includes a description and analysis of sensors based on the giant magnetoresistive effect (GMR) and the anisotropic magnetoresistive (AMR) effect

- Provides a detailed analysis of mechanical gyroscopes, clinometers, and accelerometers
- Contains the classic means of measuring electrical quantities
- Examines digital interfaces in measurement systems
- Defines digital signal conditioning in instrumentation
- Addresses solid-state chemical microsensors and wireless instrumentation
- Introduces mechanical microsensors (MEMS and NEMS)
- Details examples of the design of measurement systems

Introduction to Instrumentation and Measurements is written with practicing engineers and scientists in mind, and is intended to be used in a classroom course or as a reference. It is assumed that the reader has taken core EE curriculum courses or their equivalents.

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About the Author

**Robert B. Northrop**, PhD, majored in electrical engineering (EE) at MIT, graduating with a bachelor's degree in 1956. At the University of Connecticut, he earned his master's degree in electrical and systems engineering in 1958. As the result of a long-standing interest in physiology, he enrolled in a PhD program at UCONN in physiology, doing research on the neuromuscular physiology of molluscan catch muscles. He received his PhD in 1964. In 1963, he rejoined the UCONN EE Department as a lecturer and was hired as an assistant professor of EE in 1964. He has written numerous papers in peer-reviewed journals, and 12 textbooks including the following books published by CRC Press: ***Introduction to Instrumentation and Measurements (1997), Endogenous and Exogenous Regulation and Control of Physiological Systems (2000), Dynamic Modeling of Neuro-Sensory Systems (2001), Noninvasive Instrumentation and Measurements in Medical Diagnosis (2002), Analysis and Application of Analog Electronic Circuits in Biomedical Engineering (2004), Introduction to Instrumentation and Measurements?2nd edition (2005), Introduction to Molecular Biology, Genomics & Proteomics for Biomedical Engineers (with Anne N. Connor) (2008), Signals and Systems Analysis in Biomedical Engineering?2nd edition (2010), Introduction to Complexity and Complex Systems (2011), Analysis and Application of Analog Electronic Circuits in Biomedical Engineering?2nd edition (2012), and Ecological Sustainability: Understanding Complex Issues (with Anne N. Connor) (2013).***

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