

ME3200

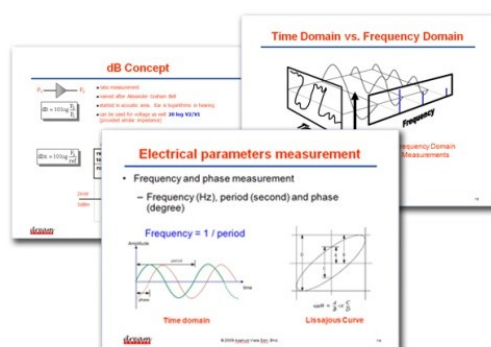
Electronic Instrumentation and Measurement Courseware

dream
CATCHER
~Complete Resources for Lecturers~

KEYSIGHT
TECHNOLOGIES
Solutions Partner
Extending our solutions to meet your needs

Teaching slides

- Editable Microsoft® PowerPoint® slides
- Covers 45 hours of teaching



Training kit

- Electronic instrumentation kit
- Lab sheets & model answers
- Problem-based assignments
- Covers 36 hours of labs



Target university subject	Target year of study	Prerequisite(s)
Induction Program (Practical Measurement Using Basic Instruments)	1st year undergraduate	None
Electronic Instrumentation and Measurement Techniques	1st or 2nd year undergraduate	None

The ME3200 serves as a ready-to-teach package in the areas of electronic instrumentation and measurement techniques. This is a lecturer resource consisting of teaching slides, training kits, lab sheets, and problem-based assignments.

Designed to impart knowledge in

- Measurement principles
- End-to-end measurement system
- Introduction to measurement instruments
- Usage of instrument programming tools
- Usage of basic instruments

Benefits of the ME3200 courseware

- The training kit helps students understand an end-to-end measurement system, which includes various sensors, signal conditioning circuits, op-amp circuits, and digital I/Os.
- The on-board circuits can be viewed easily, allowing students to understand how circuits are built and connected.
- Lab sheets are specially designed to enhance student's understanding in measurement principles.
- The courseware can also be used to conduct an induction program for beginners to gain exposure on how to operate basic instruments such as power supplies, functions generators, oscilloscopes, and multimeters.
- You have the flexibility to configure your lab using conventional benchtop or PC-based modular instruments—the modular instruments save space and allow you to easily mix and match different instruments based on your lab requirement.



Teaching Slides

More than 600 editable Microsoft PowerPoint teaching slides, covering 60 hours of teaching for one full semester are provided. The slides cover the following topics:

Induction Program

- Digital Multimeter
- DC Power Supply
- Function Generator
- Digital Oscilloscope

Electronic Instrumentation and Measurement Techniques

- Basic Principles of Measurement
- Measurement of Electrical Quantities
- Quality of Measurement
- Sensors and Transducers
- Analog Signal Conditioning
- Electronic Measurement Instruments
- Introduction to Instrument Systems
- The Basics of Instrument Programming Using VEE



Training Kit

Electronic instrumentation kit

The hardware kit consists of:

- Sensors: IR proximity sensor, light dependent resistor, centigrade temperature sensor.
- Signal conditioning circuits: bridge, current amplifier, non-inverting amplifier, voltage comparator.
- Digital Output circuits: D-type flip-flops/latches, mechanical relay, buzzer.
- Others: Resonant circuit, analog-to-digital converter



Accessories

The following accessories are provided with the training kit.

Item	Quantity
Power supply cable	1 set
Jumper cable with grabber clips	6
BNC(m)-to-grabber clip cable	1
BNC(f)-to-BNC(f) cable	1
Antistatic wrist strap	1



Lab sheets

The training kit includes 12 lab sheets in editable Microsoft Word format. Each lab requires 3 hours to complete. Model answers are provided with all lab sheets. The labs can use either conventional benchtop or PC-based modular instruments.

Lab Sheet	Required Items
Electronic Instrumentation and Measurement Techniques	Power Supply, Digital Multimeter, Oscilloscope, & Function Generator
Measurement of Voltage and Current	√
Measurement of Time-Dependent Signals	√
Quality of Measurement 1	√
Quality of Measurement 2	√
Analog Signal Conditioning	√
Measurement of Digital Signals	√
Introduction to Data Flow Programming ^[1]	
Measurement Automation ^[1]	√

[1] Keysight VEE is required for this lab.

Lab Sheet	Required Items
Induction Program	
Using a Digital Multimeter	Multimeter, Function Generator & Oscilloscope
Using a Power Supply	Power Supply
Using a Function / Arbitrary Waveform Generator	Function Generator & Oscilloscope
Using a Digital Oscilloscope	Function Generator & Oscilloscope

Problem-based assignments

The problem-based assignments below allow students to enhance their problem-solving skills.

- Case Study on Dynamometry
- Motor Current and Speed-Torque Characteristics



Instruments

The recommended instruments from Keysight Technologies, to be purchased separately, are listed below. You may choose between two families of basic instruments: benchtop or modular.

Instrument ^[1]	Benchtop Family ^{[2] [5]}	Modular Family ^{[2] [5]}
Power Supply	E3631A Triple Output DC Power Supply	E3631A Triple Output DC Power Supply ^[3]
Function Generator	33511B or DSOX2WAVEGEN Function Generator	U2761A USB Modular Function Generator ^[4]
Oscilloscope	DSOX2002A 70 MHz Oscilloscope	U2701A USB Modular Oscilloscope ^[4]
Multimeter	34450A or Handheld Digital Multimeter	U2741A USB Modular Digital Multimeter ^[4]
Software		
Keysight VEE	W4000D-2TP Keysight VEE Student	W4000D-2TP Keysight VEE Student

[1] Refer to the Lab sheets section for the instrument selection.

- | | |
|------------------------|---|
| | Minimum specifications |
| 1. Power Supply: | 2 outputs with up to +/- 15V and current rating of 0.5A |
| 2. Function Generator: | Frequency up to 10 MHz |
| 3. Oscilloscope: | Bandwidth up to 20 MHz |
| 4. Multimeter: | Any handheld or bench-top multimeter. |

[2] The courseware is designed to work with these instruments. Other models with equivalent performance may be used with alterations to the lab procedures.

[3] There is no modular power supply model, therefore the E3631A is used for both instrument families.

[4] Requires a PC with Windows® XP or Windows® Vista to control the instrument via USB.

[5] These instruments are also the recommended model for ME3000 and ME3100.

Training Kit Hardware Specifications

	Op-Amp Module	
	Min	Max
Electrical		
Voltage supply (+5 V)	4.5 V	5.5 V
Voltage supply (+12 V)	11.5 V	12.5 V
Current supply (+5 V)	10.0 mA	80.0 mA
Current supply (+12 V)	100.0 mA	400.0 mA
General		
EMC designed to	IEC61326-1:2005 / EN61326-1:2006 · CISPR11:2003/EN55011:2007 · IEC 61000-4-3:2002 / EN 61000-4-3:2002	
Dimensions (W x H x D)	230 mm x 65 mm x 180 mm	
Weight	0.6 kg	
Warranty	1 year	

Ordering Information

Description	Package	Product Number
Teaching Slides	1 user license	ME3200-100
Training Kit	1 set	ME3200-200
Teaching Slides + Training Kit	1 user license + 1 set	ME3200-300
Instruments	where applicable	Purchase separately from Keysight or its distributor