ME3100

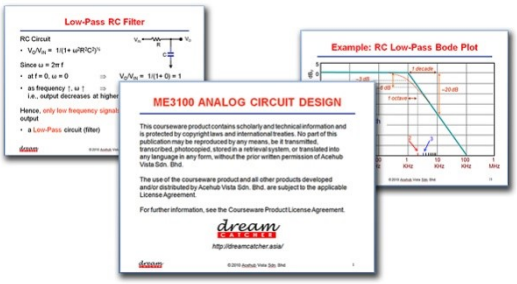
Analog Circuit Design Courseware

~Complete Resources for Lecturers~

KEYSIGHT TECHNOLOGIES
Solutions Partner
Extending our solutions to meet your needs

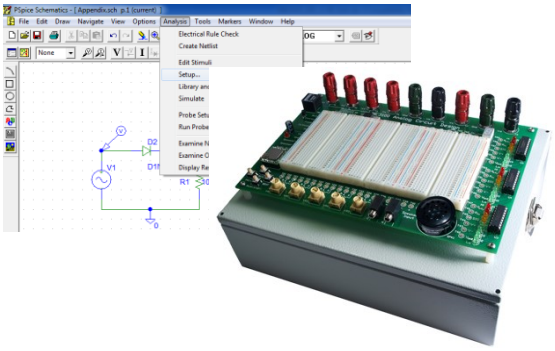
Teaching slides

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



Training kit

- Analog circuit design kit
- Lab sheets & model answers
- Problem-based assignments
- Covers 24 hours (hardware) + 21 hours (PSpice) of labs



Target university subject	Target year of study	Prerequisite(s)
Analog Circuit Design	3rd or final year undergraduate	Analog Electronics

The ME3100 serves as a ready-to-teach package in the areas of practical analog circuit analysis, design and its applications. The lab experiments are designed using a problem-based approach, allowing students to learn and solve practical analog circuit design tasks. This is a lecturer resource consisting of teaching slides, training kits, lab sheets, and problem-based assignments.

Designed to impart knowledge in

- Analog circuit analysis
- Passive and active components
- BJT & FET circuit analysis and design
- Practical op-amp design
- Active filter design
- PSpice and Measurement instruments usage

Benefits of the ME3100 courseware

- The analog circuit design kit consists of various standard circuits that can be used as building blocks to develop complete designs without needing to start from scratch.
- The embedded audio player provides the flexibility to generate simple to complex audio signals.
- Open-ended questions in the labs sheets allow students to enhance their engineering problem solving skills. This approach enables students to proactively enhance their skills in circuit design.
- The lab sheets enable students to appreciate different design considerations and approaches by allowing them to experiment with different components.
- Students get to experience both circuit design using PSpice and actual components to further strengthen the design knowledge and skill.

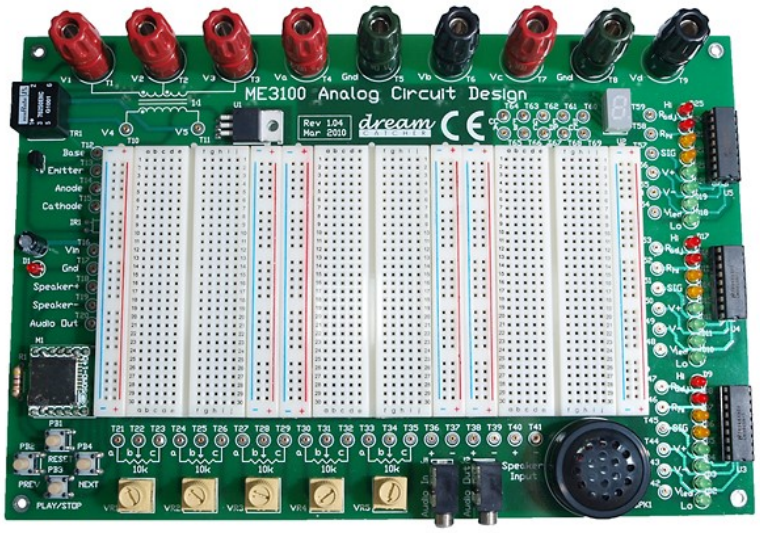
Teaching Slides

More than 400 editable Microsoft PowerPoint teaching slides, covering 45 hours of teaching for one full semester are provided. The slides cover the following topics:

- Component Characteristics for Resistor, Capacitor and Inductor
- Resistor-Capacitor-Inductor Based Circuits
- Review of Practical Circuit Analysis Techniques
- Diode Characteristics and Applications
- Bipolar Junction Transistor and MOSFET Circuits Design
- Op-Amp Based Circuits Design
- Active Filter Design and Implementation
- Case Studies 1: Wide Bandwidth Amplifier Design
- Case Studies 2: High Precision Voltage Regulator Design

Training Kit

Analog circuit design kit



The training kit hardware consists of standard on-board components and a prototyping area.

Standard On-board Components

- Audio Speaker
- Embedded Audio Player
- LED Audio VU Meter
- Analog Potentiometer
- Seven Segment Display
- Insulation Transformer
- Various test points for measurements

Prototyping Area

- Breadboard with three standard miniature blocks, with 1200 holes for connections

Accessories

The following accessories are provided with the training kit.

Item	Quantity
Power supply cable	1 set
BNC(m)-to-banana clip cable	1
Electronic components	1 set
Antistatic wrist strap	1

Lab sheets

The training kit includes 8 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 USB modular instruments.

Lab Sheet	Required Items	
	Option 1 Power Supply, Function Generator, Multimeter, & Oscilloscope	**Option 2** Pspice
Introduction to PSpice		√[1]
Designing a Voltage Regulator	√	√[1]
Designing an IR Transceiver Circuit	√	√[1]
Designing a BJT-based Amplifier	√	√[1]
Designing a FET-based Amplifier	√	Not available
Designing Op-Amp based Precision Circuits	√	√[1]
Designing an Audio Equalizer	√	√[1]
Designing a High Sensitivity IR Detector	√	Not available
Designing a High Precision Voltage Regulator	√	√[1]

[1]: a dedicated set of lab sheets for using PSpice is included

Problem-based assignments

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

- High Sensitivity RTD Sensing
- Ultrasonic Range Finder

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]

[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 ME3200.

Training Kit Hardware Specifications

	Analog Circuit Design Kit		
	Min	**Typical**	**Max**
Electrical			
Input Supply			
Voltage (variable, 0 – 15 Vdc)	0 V		15.5 V
Current		1.0 A	
Embedded Audio Player			
Sampling rate	6 kHz		32 kHz
microSD memory slot capacity			4 GB
Voltage supply	2.7 V		3.6 V
Idle current		8 µA	
Built-in Speaker			
Frequency response	500 Hz		2000 Hz
Impedance		8 ohm	
Power rating		0.15 W	
General			
EMC designed to			IEC61326-1:2005 / EN61326-1:2006 · CISPR11:2003/EN55011:2007 · IEC 61000-4-3:2002 / EN 61000-4-3:2002
Warranty			1 year

Ordering Information

Description	**Package**	**Product Number**
Teaching Slides	1 user license	ME3100-100
Training Kit	1 set	ME3100-200
Teaching Slides + Training Kit	1 user license + 1 set	ME3100-300
Instruments	where applicable	Purchase separately from Keysight or its distributor