

ME3000

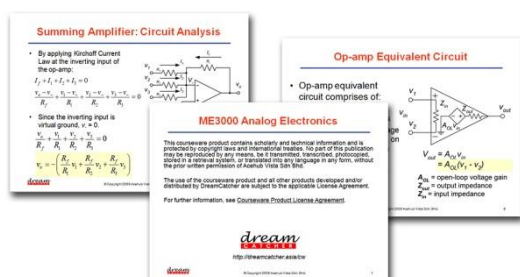
Analog Electronics Courseware

**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

- Analog electronics kit
- Lab sheets & model answers
- Problem-based assignments
- Covers 24 hours of labs



Target university subject	Target year of study	Prerequisite(s)
Analog Electronics	1st or 2nd year undergraduate	None

The ME3000 serves as a ready-to-teach package in the areas of semiconductor fundamentals, circuit analysis, and electronic device applications. This is a lecturer resource consisting of teaching slides, training kits, lab sheets, and problem-based assignments.

Designed to impart knowledge in

- Semiconductor fundamentals
- Analog electronic devices
- Analog circuit analysis
- Typical applications of electronic devices
- Measurement instruments usage

Benefits of the ME3000 courseware

- The analog electronics kit consists of the Diode & Transistor and Op-Amp modules, which contains jumpers and discrete component holders for students to select and insert different components, allowing them to characterize the behavior of diodes, transistors, op-amps, active filters, and amplifiers.
- Unlike breadboards, the modules do not require loose parts to work, resulting in minimum parts and inventory management.
- The on-board circuits can be viewed easily, allowing students to understand how circuits are built and connected.
- The provided PSpice design files can be used as reference design for assignments and to perform circuit simulation using EDA software such as the demo version of Cadence OrCAD software
- Lab sheets are specially designed to allow students to gain exposure to basic instruments such as power supplies, function generators, oscilloscopes, and multimeters.
- You have the flexibility to configure your lab using conventional benchtop or USB modular instruments – modular instruments save space and allow you to easily mix and match different instruments based on your lab requirement.



Teaching Slides

More than 500 editable Microsoft PowerPoint teaching slides, covering 45 hours of teaching for one full semester are provided. The slides cover the following topics:

- P-N Junction & Semiconductor Diodes
- Bipolar Junction Transistor
- DC Biasing
- Transistor Modeling
- Small-Signal Analysis
- Frequency Response of a BJT Amplifier
- Design of a Small-Signal BJT Amplifier
- Field-Effect Transistors Part I: Types and Characteristics
- Field-Effect Transistors Part II: Biasing
- Field-Effect Transistors Part III: Small-Signal Analysis
- Operational Amplifiers
- 555 Timer-based Multivibrators
- Oscillators
- Voltage Regulators



Training Kit

Analog electronics kit

The training kit hardware consists of the Diode & Transistor module and Op-Amp module.

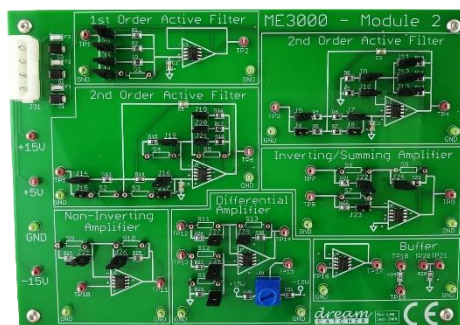
Diode & Transistor Module

- Diode circuit
- Transistor circuit
- Class A tuned amplifier
 - 555 multivibrator



Op-Amp Module

- 1st order active filter
- 2nd order active filter
- Buffer
- Inverting/summing amplifier
- Non-inverting amplifier
- Differential amplifier



PSpice design files of selected circuits are provided

Accessories

The following accessories are provided with the training kit.

Item	Quantity
Power supply cable	1
Jumper cable with grabber clips	6
BNC(m)-to-grabber clip cable	1
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
	Power Supply, Digital Multimeter, Oscilloscope & Function Generator
Diode Characteristics	√
Rectifier Circuits	√
BJT Characteristics	√
DC Biasing	√
Practical Op-Amp Circuits	√
RF Class A Tuned Amplifiers	√
555 Multivibrator Circuits	√
Active Filters	√

Problem-based assignments

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

- Basic Signal Conditioning Using Op-Amp Circuits
- 555 Multivibrator Circuits
- Low Pass Active Filter Design



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.

1. Power Supply: Minimum specifications
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 ME3100 and ME3200.

Training Kit Hardware Specifications

	Diode & Transistor Module		Op-Amp Module	
	Min	Max	Min	Max
Electrical				
Voltage supply (+5 V)	4.5 V	5.5 V		
Voltage supply (+15 V)	13.5 V	16.5 V	13.5 V	16.5 V
Voltage supply (-15 V)			-16.5 V	-13.5 V
Current supply (+5 V)	7.0 mA	10.0 mA		
Current supply (+15 V)	1.0 mA	3.0 mA	6.0 mA	8.0 mA
Current supply (-15 V)			7.0 mA	20.0 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			
Warranty	1 year			

Ordering Information

Description	Package	Product Number
Teaching Slides	1 user license	ME3000-100
Training Kit	1 set	ME3000-200
Teaching Slides + Training Kit	1 user license + 1 set	ME3000-300
Instruments	where applicable	Purchase separately from Keysight or its distributor