



# IE162: Basic Electronics (Analog & Digital)





## Training Description:

The training course will cover the essentials of basic electronic circuits and key components: their device characteristics, mathematical modeling and representation and behavioural patterns as well as the extension of the circuit analysis techniques such as Ohm's laws and Kirchhoff's laws to analyze them accordingly. These basic ideas will form the core component of the course.

### The course will discuss:

- History of electronics from vacuum tubes to large scale, classification of electronic signals, digital and analog, role of A/D and D/A converters, electronic components, symbols and identifications, semiconductivity
- Diodes and Diode circuits: diode circuits and characteristics, model, and behavior in relation to the circuits and analysis
- Field Effect Transistors and Circuits: MOSFET characteristics and model, biasing techniques, circuit symbol, analog MOSFET amplifier
- Bipolar Junction Transistors (BJT), physical structure of the BJT, circuit representation, transistor biasing and transistor ratings
- Fundamentals of digital electronics, ideal logic gates, logic level definition and dynamics response of logic gates, logic gates examples

## Training Objectives:

The objective of this course is to equip participants with the required mathematical tools necessary to analyze and understand basic analog and digital electronic components and circuits such as diodes, transistors etc. A student who completes the course successfully will be able to demonstrate among other things:

- Keen understanding of what basic electronic components are: their device structure, principle of operations, mathematical modeling and analysis, circuit representations and integrations
- Good understanding of analog and digital electronics and their corresponding circuit analysis
- Technical know-how of system behavior based on device characteristics and models

### By the end of the training, participants will be able to:

- ✓ Model engineering systems using first and second order differential equations, and solve the equations both analytically and numerically
- ✓ Employ the Taylor Series for approximation and error analysis
- ✓ Formulate and apply numerical techniques for root finding, curve fitting, differentiation, and integration
- ✓ Write computer programs to solve engineering problems with MATLAB and C++ object-oriented capabilities depending upon the nature of the problem
- ✓ Perform both hand computation and programming applied in MATLAB
- ✓ Assemble electronic circuits and electronic devices (power supplies, amplifiers, and other applications)



## Training Designed for:

This course is intended for Instrumentation and Control System Engineers, Instrumentation Technologists and Engineers, Electrical & IT Engineers, Electrical and Instrumentation Technicians.

## Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request.” (This hands-on, highly-interactive training includes simulator, real-life case studies and exercises).

**Participant laptop and version of MATLAB and PSPICE is strongly recommended for this course.**

Please note that the below topics can be amended as per client’s learning needs and objectives. Further, it should be forwarded to us 3 weeks prior to the course dates.

## Training Program:

### FIVE DAYS:

- ❖ Pre-Test
- ❖ Introduction
- ❖ History of Electronics from vacuum tubes to large scale
- ❖ Classification of electronic signals
- ❖ Digital and analog
- ❖ Role of A/D and D/A converters
- ❖ Electronic components
- ❖ Symbols and identifications
- ❖ Semi conductivity
- ❖ Diodes and Diode circuits
- ❖ Diode circuits and characteristics, model
- ❖ And behavior in relation to the circuits and analysis
- ❖ Field Effect Transistors and Circuits
  - MOSFET characteristics and model
  - Biasing techniques
  - Circuit symbol
  - Analog MOSFET amplifier
- ❖ Bipolar Junction Transistors (BJT)
- ❖ Physical structure of the BJT
- ❖ Circuit representation
- ❖ Transistor biasing and transistor ratings
- ❖ Fundamentals of digital electronics
- ❖ Ideal logic gates
- ❖ Logic level definition and dynamics response of logic gates
- ❖ Logic gates examples
- ❖ Course Conclusion
- ❖ Post-Test and Evaluation



## Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

## Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.

## Training Fees:

**As per the course location** - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01<sup>st</sup> of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

## Training Timings:

### Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

**For training registrations or in-house enquiries, please contact:**

**Aisha Relativo:** [aisha@cmc-me.com](mailto:aisha@cmc-me.com)

Tel.: +971 2 665 3945 or +971 2 643 6653 | Mob.: +971 52 2954615

Training & Career Development Department

