# CANoe Fundamentals

## Agenda VectorAcademy

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| **Delivery Format:** | This course is offered in Classroom or in Remote Format |
| **Duration:** | Classroom: 3 days<br>Remote: 20 hours |
| **Target Group:** | CANoe Users (controller development, motor vehicle electrical, test planning and execution) |
| **Prerequisites:** | None. A basic knowledge of embedded systems and programming will be useful. |
| **Goal:** | Characteristics of CAN protocol and a CAN network. Usage of CANoe as a measurement and analysis tool, logging and offline analysis, send methods and panels. Usage of CANoe and CAPL for analysis, modeling and simulation. |

### 1. Introduction to CAN

- Electronification of motor vehicles
- Primary tasks in bus networking
- Standards and implementation
- Node architecture, bus-connection and termination
- Voltage levels and corresponding bit values

### 2. Characteristics of the CAN Protocol

- Addressing, message transmission and reception
- Bus access method and arbitration
- Message types, detailed description of the structure and functions
- Increase noise immunity, neutralize errors
- Error detection mechanisms
- Error treatment & tracking
- Motivation for the bit time interval
- Relation of baud rate and length of the CAN bus
- Synchronization and resynchronization
- Introduction to CAN FD.

### 3. CAN Network Description

- Usage and content of Network Description
- Tools and Examples

### 4. Introduction

- Differentiation CANoe/CANalyzer
- Application areas
- License model and registration

### 5. Start-up of CANoe for CAN

- Configuration of used hardware

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- Creating a configuration in CANoe

**6. Measurement and Analysis**

- Introduction into the graphical user interfaces
- Dataflow, measurement setup and simulation setup
- Measurement and analysis windows for CAN
- Filter and trigger blocks
- Introduction to IG block

**7. Data Logging and Offline Analysis**

- Recording data traffic with trigger conditions
- Offline analysis

**8. Diagnostics with CANoe**

- Introduction to Diagnostics with CANoe

**9. Introduction to Simulation and Modeling**

- Simulation and modeling in the development process
- Signal Server Concept and Interaction Layer
- Overview of OEM extensions
- Creating a configuration for simulation and modeling
- Signal access and generation

**10. Introduction to CAPL**

- Usage of CAPL
- Introduction to the CAPL browser
- Network nodes and program nodes

**11. Panels**

- Panel Creation

**12. Signal-oriented CAPL**

- CAPL with Signal Server and Interaction Layer
- Controlling network nodes
- Signal manipulation with CAPL
- System and environment variables
- Working with timers

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**13. Message-oriented CAPL**

- Analysis nodes in the measurement setup
- System variables
- Simulation nodes without interaction layer

**14. Test Modules**

- Test environments and CAPL test modules