

Chapter 0: Introduction

After completing Chapter 0 you will understand the objectives for the WICED Bluetooth 101 Class. You should be able to explain the learning objectives, agenda, scope of the class, and format of the lab manual.

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|------------|----------------------------|----------|
| 0.1 | PREREQUISITES | 1 |
| 0.2 | SCOPE | 1 |
| 0.3 | AGENDA | 2 |

0.1 Prerequisites

Solid fundamentals in C-Programming (data types, operators, expressions, control flow, functions, program structure, pointers and arrays, data structures, multi-file module programming).

Some experience with standard MCU concepts and peripherals (Serial communication, PWMs, ADCs).

0.2 Scope

What this class is:

- A survey of the Cypress Bluetooth Ecosystem (Chips, Modules, ModusToolbox IDE, BT Software Development Kit (SDK), Forum etc.)
- A survey of using the BT SDK to create Bluetooth devices by connecting common MCU I/O peripherals to an external Bluetooth client (e.g. a smartphone)
- An introduction to Bluetooth Low Energy (BLE)
- An introduction to Classic Bluetooth (Basic Rate and Extended Data Rate)
- An introduction to Bluetooth Mesh

What this class is not:

- A discussion/debate of what WICED or ModusToolbox should be.
- A C-programming primer.
- A detailed examination of Bluetooth or RF Parameters.
- An introduction to Wi-Fi.
- An introduction to ZigBee.
- A discussion of Linux integrated WICED.
- A discussion of how to pick the correct Bluetooth module or device
- A detailed examination of MCU peripherals.

0.3 Agenda (8AM Start)

| Day | Time | Duration | Chapter | Topic | Purpose |
|-----|---------------|----------|--|----------|--|
| 1 | 8:00 – 8:15 | 0:15 | 00 Intro | Lecture | An Introduction to the class (this document) |
| 1 | 9:15 – 9:00 | 0:45 | 01 Tour | Lecture | A tour of the BT SDK, Bluetooth Standard, Chips, Modules, and Kits. Details on creating and building projects. |
| 1 | 9:00 – 9:30 | 0:30 | | Demo/Lab | |
| 1 | 9:30 – 10:00 | 0:30 | 02 Peripherals | Lecture | How to use peripherals such as GPIOs, interrupts, UART, I2C, etc. |
| 1 | 10:00 – 12:30 | 2:30 | | Lab | |
| 1 | 12:30 – 1:00 | 0:30 | 03 RTOS | Lecture | How to use the ThreadX RTOS in a WICED chip. |
| 1 | 1:00 – 1:45 | 0:45 | | Lab | |
| 1 | 1:45 – 2:30 | 0:45 | 04A The Essential BLE Peripheral Example | Lecture | Introduction to BLE, Advertising, Connecting, and Exchanging data. |
| 1 | 2:30 – 5:00 | 2:30 | | Lab | |
| 1 | 5:00 – 5:15 | 0:15 | Wrap-Up | Lecture | Day 1 Wrap Up |
| 2 | 8:00 – 8:45 | 0:45 | 04B More Advanced BLE Peripherals | Lecture | Notification, Indication, Pairing, Bonding, Security |
| 2 | 8:45 – 11:15 | 2:30 | | Lab | |
| 2 | 11:15 – 12:00 | 0:45 | 04C BLE Low Power, Beacons, OTA | Lecture | Low Power, Beacons, OTA |
| 2 | 12:00 – 2:00 | 2:00 | | Labs | |
| 2 | 2:00 – 2:45 | 0:45 | 04D BLE Centrals | Lecture | BLE Central devices, scanning, service discovery |
| 2 | 2:45 – 4:45 | 2:00 | | Labs | |
| 2 | N/A | 0:00 | 04E BLE Protocol Details | Lecture | Lower level details on the BLE protocol |
| 2 | 4:45 – 5:00 | 0:15 | Wrap-Up | Lecture | Class Wrap-Up and Surveys |
| 3 | 8:00 – 8:30 | 0:30 | 05 Debugging | Lecture | How to use BTSpy. How to use the WICED SDK debugger. How to use 3 rd party debugging tools. |
| 3 | 8:30 – 9:15 | 0:45 | | Lab | |
| 3 | 9:15 – 9:15 | 0:00 | 06A Classic Bluetooth | Lecture | How to use the Classic BT Serial Port Profile (SPP) |
| 3 | 9:15 – 9:15 | 0:00 | | Lab | |
| 3 | 9:15 – 9:15 | 0:00 | 06B Classic Bluetooth Protocol Details | Lecture | Lower level details on the Classic Bluetooth protocol |
| 3 | 9:15 – 10:15 | 1:00 | 07A Bluetooth Mesh Topology | Lecture | Specs, network topology, provisioning |
| 3 | 10:15 – 10:45 | 0:30 | | Demo/Lab | |
| 3 | 10:45 – 11:45 | 1:00 | 07B Mesh Details | Lecture | Models, security, stack architecture, packet details |
| 3 | 11:45 – 12:15 | 0:30 | | Lab | |
| 3 | 12:15 – 1:00 | 0:45 | 07C Mesh Firmware | Lecture | Creating Mesh Applications in WICED using ModusToolbox |
| 3 | 1:00 – 3:00 | 2:00 | | Lab | |
| 3 | 3:00 – 3:15 | 0:15 | Wrap-Up and Surveys | Lecture | Class Wrap-Up and Surveys |
| 3 | 3:15 – 5:00 | 1:45 | Self-Paced Exploration | Lab | Students work on whatever is most useful to them |

0.4 Agenda (9AM Start)

| Day | Time | Duration | Chapter | Topic | Purpose |
|-----|---------------|----------|--|----------|--|
| 1 | 9:00 – 9:15 | 0:15 | 00 Intro | Lecture | An Introduction to the class (this document) |
| 1 | 9:15 – 10:00 | 0:45 | 01 Tour | Lecture | A tour of the BT SDK, Bluetooth Standard, Chips, Modules, and Kits. Details on creating and building projects. |
| 1 | 10:00 – 10:30 | 0:30 | | Demo/Lab | |
| 1 | 10:30 – 11:00 | 0:30 | 02 Peripherals | Lecture | How to use peripherals such as GPIOs, interrupts, UART, I2C, etc. |
| 1 | 11:00 – 1:00 | 2:00 | | Lab | |
| 1 | 1:00 – 1:30 | 0:30 | 03 RTOS | Lecture | How to use the ThreadX RTOS in a WICED chip. |
| 1 | 1:30 – 2:00 | 0:30 | | Lab | |
| 1 | 2:00 – 2:45 | 0:45 | 04A The Essential BLE Peripheral Example | Lecture | Introduction to BLE, Advertising, Connecting, and Exchanging data. |
| 1 | 2:45 – 5:00 | 2:15 | | Lab | |
| 1 | 5:00 – 5:15 | 0:15 | Wrap-Up | Lecture | Day 1 Wrap Up |
| 2 | 9:00 – 9:45 | 0:45 | 04B More Advanced BLE Peripherals | Lecture | Notification, Indication, Pairing, Bonding, Security |
| 2 | 9:45 – 12:15 | 2:30 | | Lab | |
| 2 | 12:15 – 1:00 | 0:45 | 04C BLE Low Power, Beacons, OTA | Lecture | Low Power, Beacons, OTA |
| 2 | 1:00 – 2:45 | 1:45 | | Labs | |
| 2 | 2:45 – 3:30 | 0:45 | 04D BLE Centrals | Lecture | BLE Central devices, scanning, service discovery |
| 2 | 3:30 – 5:00 | 1:30 | | Labs | |
| 2 | N/A | 0:00 | 04E BLE Protocol Details | Lecture | Lower level details on the BLE protocol |
| 2 | 5:00 – 5:15 | 0:15 | Wrap-Up | Lecture | Class Wrap-Up and Surveys |
| 3 | 9:00 – 9:30 | 0:30 | 05 Debugging | Lecture | How to use BTSpy. How to use the WICED SDK debugger. How to use 3 rd party debugging tools. |
| 3 | 9:30 – 10:15 | 0:45 | | Lab | |
| 3 | 10:15 – 10:15 | 0:00 | 06A Classic Bluetooth | Lecture | How to use the Classic BT Serial Port Profile (SPP) |
| 3 | 10:15 – 10:15 | 0:00 | | Lab | |
| 3 | 10:15 – 10:15 | 0:00 | 06B Classic Bluetooth Protocol Details | Lecture | Lower level details on the Classic Bluetooth protocol |
| 3 | 10:15 – 11:15 | 1:00 | 07A Bluetooth Mesh Topology | Lecture | Specs, network topology, provisioning |
| 3 | 11:15 – 11:45 | 0:30 | | Demo/Lab | |
| 3 | 11:45 – 12:45 | 1:00 | 07B Mesh Details | Lecture | Models, security, stack architecture, packet details |
| 3 | 12:45 – 1:15 | 0:30 | | Lab | |
| 3 | 1:15 – 2:00 | 0:45 | 07C Mesh Firmware | Lecture | Creating Mesh Applications in WICED using ModusToolbox |
| 3 | 2:00 – 4:00 | 2:00 | | Lab | |
| 3 | 4:00 – 4:15 | 0:15 | Wrap-Up and Surveys | Lecture | Class Wrap-Up and Surveys |
| 3 | 4:15 – 5:15 | 1:00 | Self-Paced Exploration | Lab | Students work on whatever is most useful to them |