Chapter 0: Introduction

Time ¼ Hour

After completing Chapter 0 you will understand the objectives for the Wireless Internet Connectivity for Embedded Devices (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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# 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).

# Scope

What this class is:

* A survey of the WICED Bluetooth Ecosystem (Chips, Modules, WICED Studio IDE, Software Development Kit (SDK), Forum etc.)
* A survey of using the WICED 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).

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.

# Agenda

| **Day** | **Time** | **Duration** | **Chapter** | **Topic** | **Purpose** |
| --- | --- | --- | --- | --- | --- |
| 1 | 8:00 – 8:15 | 0:15 | 00 Intro | Lecture | An Introduction to the class (this document) |
| 1 | 8:15 – 8:45 | 0:30 | 01 Tour | Lecture | A tour of the WICED Bluetooth SDK, Bluetooth Standard, Chips, Modules, and Kits. |
| 1 | 8:45 – 9:15 | 0:30 | Lab |
| 1 | 9:15 – 9:45 | 0:30 | 02 Peripherals | Lecture | How creating/build/program a project and how to use chip peripherals such as GPIOs, interrupts, UART, I2C, etc. |
| 1 | 9:45 – 11:30 | 1:45 | Lab |
| 1 | 11:30 – 12:00 | 0:30 | 03 RTOS | Lecture | How to use the ThreadX RTOS in a WICED chip. |
| 1 | 12:00 – 12:45 | 0:45 | Lab |
| 1 | 12:45 – 1:30 | 0:45 | 04A The Essential BLE Peripheral Example | Lecture | Introduction to BLE, Advertising, Connecting, and Exchanging data. |
| 1 | 1:30 – 3:30 | 2:00 | Lab |
| 1 | 3:30 – 4:15 | 0:45 | 04B More Advanced BLE Peripherals | Lecture | Notification, Indication, Pairing, Bonding, Security |
| 1 | 4:15 – 5:15 | 1:00 | Labs |
| 1 | 5:15 – 5:30 | 0:15 | Wrap-Up | Lecture | Day 1 Wrap Up |
| 2 | 8:00 – 9:00 | 1:00 | 04B Labs Continued | Labs | Continuation of Labs |
| 2 | 9:00 – 9:45 | 0:45 | 04C Even More Advanced BLE | Lecture | Beacons, Low Power, OTA |
| 2 | 9:45 – 10:45 | 2:00 | Labs |
| 2 | 10:45 – 11:30 | 0:45 | 04D BLE Centrals | Lecture | BLE Central devices, scanning, service discovery |
| 2 | 11:30 – 1:00 | 1:30 | Labs |
| 2 | N/A | 0:00 | 04E BLE Protocol Details | Lecture | Lower level details on the BLE protocol |
| 2 | 1:00 – 1:30 | 0:30 | 05 Debugging | Lecture | How to use BTSpy. How to use WICED SDK debugger. How to use 3rd party debugging tools. |
| 2 | 1:30 – 3:00 | 1:30 | Lab |
| 2 | 3:00 – 3:45 | 0:45 | 06A Classic Bluetooth – The Wireless Serial Port | Lecture | Introduction to Classic Bluetooth (BR/EDR) and SPP. |
| 2 | 3:45 – 5:15 | 1:30 | Lab |
| 2 | N/A | 0:00 | 06B Classic Bluetooth Protocol Details | Lecture | Lower level details on the Classic Bluetooth protocol, other profiles |
| 2 | 5:15 – 5:30 | 0:15 | Wrap-Up and Surveys | Lecture | Class Wrap-Up and Surveys |
| N/A | N/A | 0 | 07 Shield | Reference | Details on the PSoC AFE shield board |

Most of the chapters have exercises. Some are marked as "Advanced". You should focus on the basic exercises first and work on the advanced ones as time allows.