Chapter 0: Introduction

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

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 ModusToolbox 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 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 Bluetooth.
- 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 ModusToolbox IDE, 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.
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	N/A	0:00	08 Hosted Mode (PSoC 6 + 43012)	Lecture	An introduction to using a PSoC 6 for Bluetooth with a CYW43012 in hosted mode.
3	3:00 – 3:15	0:15	Wrap-Up and Surveys	Lecture	Class Wrap-Up and Surveys

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 ModusToolbox, 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.
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	N/A	0:00	08 Hosted Mode (PSoC 6 + 43012)	Lecture	An introduction to using a PSoC 6 for Bluetooth with a CYW43012 in hosted mode.
3	N/A	0:00		Lab	
3	4:00 – 4:15	0:15	Wrap-Up and Surveys	Lecture	Class Wrap-Up and Surveys

0.5 Document Conventions

Convention	Usage	Example
`Courier New`	Displays code	`CY_ISR_PROTO(MyISR);`
Italics	Displays file names and paths	*sourcefile.hex*
[**bracketed, bold**]	Displays keyboard commands in procedures	[**Enter**] or [**Ctrl**] [**C**]
Menu > Selection	Represents menu paths	**File > New Project > Clone**
Bold	Displays commands, menu paths and selections, and icon names in procedures	Click the **Debugger** icon, and then click **Next**.