# **Tentative Schedule for Software and Hardware Co-Design with Zybo -- Week 1 (As of 8-9-2021)** Monday to Saturday, August 9-15, 2021

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| Day | **9:00-10:50am** | **11:00-11:50** | **2:30-3:20pm Due date** | **3:30-4:20pm** | **Handouts** |
| 1  Monday  (August 9)  Verilog Review  Zybo Introduction | * Lecture 1 Combinational and Sequential Circuits in Verilog * Lab 0 Vivado installation and Gate3 implementation with Vivado * Lab #0 and Homework #1 assigned |  |  |  | * Lab 0 handout * Homework #1 handout * Hamming decoder test bench * Problem 10 UART modules |
| 2  Tuesday  (August 10)  I2C Master Module | * Lecture 2-1 Zybo, FPGA, PicoBlaze and UART Clock * Lecture 2-2 ASM chart and Controller Design * Lab #1 Xilinx Tool Flow and UART Clock |  | * Lab #0 due |  | * Gate3 project. * Detect011 project, f * our counters project,   debouncer and one shots project |
| 3  Wednesday  (August 11)  VGA | * Lecture 3-2 Design of I2C Controller in Verilog * Lab #2 Phase 1 I2C Controller |  | * Lab #1 Xilinx Tool Flow and UART Clock due |  | * Lab2 phase 1 handout * Lab2 phase 1 files * Lecture 3-1 handout * Lecture 3-1 worksheet * TMP101 datasheet |
| 4  Thursday  (August 12)  Zynq Intro | * Lecture 3-2 Reading TMP101 * Lab #2 Phase 2 TMP101 |  | * Lab 2 Phase 1 due * Homework #1 due |  | * Uarttypewriter project * Lecture 3-2 ppt |
| 5  Friday  (August 13)  AXI4, IP, SDK, XDC, Timers | * Lecture 5 Introduction to Zynq, IO pins and memory * Lab #3 part 1 and part 2Block design and adding IP cores |  | * Lab #2 Phase 2 TMP101 due |  | * Lecture 4-1 and 4-2 ppt * Lab 3 part 1 and part 2 handout |
| 6  Saturday  (August 14) | * Lecture 6 Board definition, LED ip, drivers, Timers, Debugging * Lab #4 part 1 and part 2 Add custom IP and write basic software * Homework #2 assigned |  | * Lab #3 Block design and adding IP due |  | * Lab 4 part 1 and part 2 handouts * Lecture 5-1 and 5-2 ppt * Homework 2 handout |

# **Schedule for Software and Hardware Co-Design with Zybo -- Week 2** Monday to Saturday, August 16-22, 2021

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| Day | **9:00-10:50am** | **10:30-11:30** | **2:30-3:20pm Due date** | **3:30-4:20pm** | **Handouts of the day** |
| 7  Monday  (August 16)  Interrupt  I2C Modules | * Lecture 6 Board definition, LED ip, drivers, Timers, Debugging * Lab #5 Software and Timer * Lab #6 Ping Pong Game on Zybo with Polling |  | * Lab #4 Add custom IP and write basic software due |  | * Lab 5 handouts * Lecture 6 ppt * Lab 6 handout |
| 7  Tuesday  (August 17)  UART IP  DMA, VGA | * Lecture 7 LED Ping-Pong Game with Polling, sdk, XDC * Lecture 8 Interrupts and interrupt-driven pingpong game * Lab #7 Interrupt-driven Ping-Pong on Zybo |  | * Lab #5 Software and Timer due |  | * Lecture 7 ppt * Lecture 8 ppt * Lab 7 handout |
| 8  Wednesday  (August 18)  VGA, Color generation  Bootloader | * Lecture 9 ARM I2C Module and Driver, UART ip   Lab #8 I2C and UART with ARM modules |  | * Lab #6 Ping Pong Game on Zybo with Polling due |  | * Lab 8 I2C handout * Lecture 9 * xiicps\_polled\_master\_example.c |
| 9  Thursday  (August 19)  Embedded Linux | * Lecture 10 VGA and RBG color generation * Lab #9 VGA, Image Creation and Boot Loader on Zybo |  | * Lab #7 Interrupt-driven Ping-Pong on Zybo due * Homework #2 due |  |  |
| 10  Friday  (August 20)  ARM Cortex A9  Lab #11 | * Lecture 11 Embedded Linux with Zybo and ARM Cortex A9 Architecture * Lab #10 Embedded Linux with Zybo |  | * Lab #8 2C and UART with ARM modules due |  |  |
| 11  Saturday  (August 21) | * Lecture 12 Device Tree, Ubuntu and Linux Basics, software and hardware co-design |  | Lab #9 VGA, Image Creation and Boot Loader on Zybo |  |  |
| 11  Saturday  (August 22) |  |  | Lab #10 Embedded Linux with Zybo |  |  |