**STUDY GUIDE for Quiz 2 Spring 2017**

**Quiz2, open book, Friday, April 21, 9:00 to 9:50 am, Regular classroom**  
Open book, open notes, calculator (no laptops, phones, devices with screens larger than a TI-89 calculator, devices with wireless communication). I recommend the text book, and solutions to your Labs 5, 6 (SCH), and 9. You will not be allowed to share items with other students. I recommend that write in your book/notes and to place tabs on the pages to help you find things quickly (e.g., SSI timing, ADC registers, ADC parameters, fixed-point definitions, and timer registers and examples, analog circuits.)

**You will not be allowed to call any TivaWare functions.** You can use the standard I/O port definitions as found in the book and tm4c123gh6pm.h. I expect you to be able to initialize and use:
- parallel ports (all of Table 4.2)
- periodic SysTick interrupts, periodic timer interrupts,
- edge-triggered interrupts, input capture interrupts
- SSI busy-wait,
- ADC software start, multiple channel, busy-wait, ADC timer triggering.

**STUDY GUIDE for Quiz 2 (Quiz 1 stuff plus the following)**

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<td>Temperature measurement, ADC, analog circuits, standard deviation, measurements, noise, FFT</td>
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- **Lab 5 reading**
  - Valvano Section 4.5 on edge-triggered input
  - Valvano Section 4.6 on output modes
  - Valvano Chapter 5 on interrupts (SysTick periodic, edge-triggered, and timer periodic)
  - Valvano Section 8.4.1 on DAC parameters
  - Valvano Section 8.4.2 on waveform generation
  - Valvano Section 7.5 on SSI

- **Lab 7 review**
  - Figure 1.14 on capacitance
  - Section 9.2 LM2937-3.3 and LP2950-3.3 (capacitors, dropout voltage, output voltage, input voltage)
  - Interfacing simple chips like 74HC165, 74HC374, 74HC595

- **Lab 9 reading**
  - Valvano Section 8.1 on resistors and capacitors
  - Valvano Section 8.2 on op amps, instrumentation amp, circuit design, and threshold detector
  - Valvano Section 8.3 on analog filters
  - Valvano Section 8.5 on ADC
  - Valvano Section 10.1 on Data Acquisition Systems
  - Valvano Section 10.2 on Transducers
  - Valvano Section 10.4 on Nyquist Theory, precision
  - Valvano Section 10.5 on DAS design

*Please look at the Fall 2012, Fall 2014, Fall 2015, and Fall 2016 exams, but don’t just study these exams.*

**SSI interfacing**

- **Spring 2001 Final, Question 3**, Two 6812 SPI interface
- **EE345M Spring 2000, Final, Q1 (b-e)**, SPI interface
- **EE345M Spring 2001, Final, Q3**, SPI interface
- **Final Spring 2004, Question 6** SPI interface
- **Final Spring 2004, Question 16**, Master/slave interface
- **Spring 2005 Quiz 2, Question 5**, SPI interface
- **Spring 2005 Final, Question 12**, DAC/SPI interface
- **Spring 2006 Quiz 2, Question 1**, SPI interface to a shift register
- **Spring 2006 Quiz 2, Question 5**, SPI interface
- **Spring 2007 Quiz 2, Question 2**, SPI waveforms
- **Fall 2007 Quiz 2, Question 2**, 74HC165 interface
Spring 2008 Quiz 2, Question 3, SPI timing and interface
Fall 2008 Quiz 2, Question 2, Virtual SPI using Port T
Fall 2008 Final, Question 4, SPI timing and interface
Fall 2008 Final, Question 5, RC time constant of signals on a cable
Fall 2009 Quiz 2, Question 5, SPI modes
Fall 2012 Quiz 2, Question 2, Bit-bang SSI output (making SSI signals with GPIO port)
Fall 2014 Quiz 2, Question 3, SPI timing, set up and hold, timing diagrams
Fall 2015 Quiz 2, Question 3, SPI mode, hardware FIFO buffering
Fall 2016 Quiz 2, Question 3, Bit-bang SSI output (making SSI signals with GPIO port)

Analog interfacing
Spring 2002 Final, Question 5, ADC resolution
Spring 2002 Final, Question 6, Nyquist theorem
Spring 2003 Final, Question 4, ADC resolution
Spring 2004 Quiz 2, Question 5, Nyquist theorem
Final Spring 2004, Question 5, ADC resolution
Final Spring 2004, Question 10, ADC operation, where are the results?
Spring 2005 Quiz 2, Question 1, ADC resolution
Spring 2005 Final, Question 11, ADC resolution
Spring 2006 Quiz 2, Question 4, ADC resolution
Spring 2006 Final, Question 10, ADC precision
Spring 2007 Quiz 2, Question 4, Data acquisition design
Fall 2007 Quiz 2, Question 4, ADC setup, and data acquisition ISR
Fall 2007 Quiz 2, Question 5, Analog amplifier
Spring 2008 Quiz 2, Question 4, Data acquisition design
Fall 2008 Quiz 2, Question 4, Data acquisition design
Fall 2009 Quiz 2, Question 6, Analog amplifier
Fall 2010 Quiz 2, Question 7, Analog amplifier
Fall 2012 Quiz 2, Question 3, Data acquisition design
Fall 2012 Quiz 2, Question 4, Resolution versus accuracy
Fall 2012 Quiz 2, Question 6, Analog amplifier
Fall 2014 Quiz 2, Question 5, Low-pass analog filter, Butterworth 2-pole filter
Fall 2014 Quiz 2, Question 7, Analog amplifier
Fall 2015 Quiz 2, Question 2, Sampling, DFT, frequency resolution
Fall 2015 Quiz 2, Question 5, Gain versus frequency of RC HPF circuit
Fall 2015 Quiz 2, Question 7, Instrumentation amp
Fall 2016 Quiz 2, Question 2, Resolution versus accuracy
Fall 2016 Quiz 2, Question 5, Gain versus frequency of BPF circuit
Fall 2016 Quiz 2, Question 7, Analog amplifier

Fixed Point
Spring 2003 Final, Question 6, Fixed-point calculation
Spring 2003 Quiz 1, Question 7-10, Fixed point numbers
Final Spring 2004, Question 7, Fixed-point calculation
Spring 2005 Quiz 1, Questions 1,7, Fixed point numbers
Fall 2008 Quiz 2, Question 1, Table look up and interpolation
Fall 2008 Final, Question 3, Fixed-point calculation
Fall 2009 Quiz 2, Question 1, Precision of various calculations
Fall 2010 Quiz 2, Question 5, Fixed-point design, implementation
Fall 2012 Quiz 2, Question 5, Binary fixed-point
Fall 2014 Quiz 2, Question 6, Decimal fixed-point
Fall 2015 Quiz 2, Question 6, Decimal fixed-point, prevent overflow
Fall 2016 Quiz 2, Question 6, Decimal fixed-point

Interrupt programming concepts and implementations
Quiz 1 Spring 2001, Question 1, C programming
Spring 2002 Quiz 1, Question 3, Interrupt stack
Spring 2003 Final, Question 3, What happens if the ISR doesn’t acknowledge?
Spring 2003 Final, Question 11,14,18, Definitions
Spring 2003 Final, Question 19d,19e, Acknowledge interrupt
Spring 2004 Quiz 2, Question 1, Interrupt programming
Spring 2004 Quiz 2, Question 3, I/O bound versus CPU bound
Spring 2004 Final, Question 2, When does an interrupt occur?
Spring 2004 Final, Question 3, What happens if the ISR doesn’t acknowledge?
Spring 2004 Final, Question 17, Interrupt stack
Spring 2004 Final, Question 22, I/O bound versus CPU bound
Fall 2010 Quiz 2, Question 4, Solve with either input capture or edge-triggered interrupts
Fall 2012 Quiz 2, Question 7, Edge-trigger interrupts
Fall 2014 Quiz 2, Question 2, Busy-wait versus interrupt
Fall 2014 Quiz 2, Question 4, Edge-trigger interrupts, priority
Fall 2014 Quiz 2, Question 8, Timer interrupts, input capture
Fall 2015 Quiz 2, Question 4, Edge-trigger interrupts, priority
Fall 2016 Quiz 2, Question 4, Timer-triggered ADC interrupts

Systems and interfacing
Fall 2009 Quiz 2, Question 2, Capacitors
Fall 2009 Quiz 2, Question 3, C programming
Fall 2009 Quiz 2, Question 4, Parallel port expander
Fall 2010 Quiz 2, Question 1, Parallel I/O macro
Fall 2010 Quiz 2, Question 2, Pi filter
Fall 2010 Quiz 2, Question 6, Capacitors, what does 123 printed on it mean?
Fall 2012 Quiz2, Question 1, Regulator
Fall 2014 Quiz2, Question 1, Regulator
Fall 2015 Quiz2, Question 1, Regulator
Fall 2016 Quiz2, Question 1, Regulator