EE241 Lab Kit For Spring 2019 Draft Jan 2 2019

1 74LS00N quad NAND* (students should have already had one from EE283)
1 74LS02N quad NOR
1 74LS03N quad NAND open collector
2 74LS04N hex inverter* (students should have already had one from EE283)
3 74LS08N quad AND* (students should have already had one or two from EE283)
2 74LS10N triple NAND
2 74LS11N triple AND* (students should have already had two from EE283)
1 74LS14N hex Schmitt trigger inverter
2 74LS20N dual NAND
1 74LS27N triple NOR
1 74LS30N NAND
1 74LS42N decimal decoder
1 74LS47N seven segment decoder* (students should have already had 3 from EE283)
2 74LS74N dual D edge triggered latch
1 74LS75 or 74LS175 quad D latch (whichever is cheaper)
1 74LS86N quad XOR
2 74LS93N or 74LS293N 4 bit asynchronous counter (whichever is cheaper)
1 74LS107N or 74LS109, 74LS112 or some other JK latch, (whichever is cheaper)
1 74LS123N dual 1-shot
1 74LS138N 1 to 8 demux / decoder
1 74LS139N dual 1 to 4 decoder / demux
1 74LS153N dual 4 to 1 mux
1 74LS193N synchronous 4 bit binary counter
1 74LS244N octal bus driver
1 74LS283N four bit adder (students may have gotten one in EE283)
1 74LS373N octal tri-state latch
1 GAL16V8 25ns GAL
1 27C256 or similar UVEPROM (any size, whatever's cheapest – may be pull-outs)
1 4MHz full can TTL oscillator (need to be sure pins are long enough)
4 PN2222 or PN2222A NPN general purpose transistors (or similar)
4 PN2907 or PN2907A PNP general purpose transistors (or similar)
8 1N4148 signal diodes (or similar)
8 Red LED's
8 Yellow LED's
8 Green LED's
2 Blue LED's (These are more expensive.)
4 7 segment common anode display (for "vertical" mounting on breadboard)* (have 3)

either: (different for different students – for Lab 5)
2 extra 74LS03's OR 1 extra 74LS153 OR 1 extra 74LS244

either: (different for different students – for Lab 2)
7400N or 74ALS00N or 74C00N or 74F00N or 74HCT00N (other?)

20 1.0K Ohm ¼ W resistors
2 1000 uF, 6.3V or more electrolytic capacitors (typically radial –cheaper)* (have one)
6 4.7 uF (or anything 2.2uF up) 16V Tantalum capacitors* (should have 2 from EE283)
1 DIP switch, 9 or more positions (legs need to be long enough for breadboard!)
2 SPST N.O. pushbuttons (typically red button)
1 SPDT pushbutton (if available at acceptable price)
1 Big solderless breadboard (4 strips for components)
1 5V power supply* (at least 1A, needs overcurrent protection, if EE283 supply was <1A)

Note: Plan to use FPGA boards with Byteblaster for Traffic Light Controller lab – not in kit

Former EE283 Lab Kit (needs to be part of EE241 kit this time)
Below items would normally have been in the EE283 Measurement Lab kit. Many of these are needed for BOTH EE241 and EGR222. Some of these items will be needed later in EE252. Every EE241 student should get them, and at least one in every pair for EGR222. Probably it is best to distribute in EE241, supplement as needed for EGR222. I have deleted discrete components from the list below that were conveniently added to the EE241 list such as the LEDs, tantalum capacitors, and digital IC's. Some of these items will be needed later in EE252.

1 Set of alligator clip wires (not the largest set – I favor the smaller size. 10 wires)
1 Long Nose Pliers (including cutter not necessary)
1 Wire cutters (should allow cutting close to the surface – "flush cutter")
1 Inexpensive DMM (should have transistor hfe, diode/continuity, various V, I, Ohms) – try to avoid models that use unusual battery types.)
1 extra fuse for above meter
1 Inexpensive power supply with 5V, +12V (or 15, 18), -12V (or -5, -15, -18). If this has at least 1A at 5V, we do not need the separate 5V supply for EE241. Typically we have used linear supplies, but that's probably not necessary.
1 Small solderless breadboard (2 component strips, with 3 bus strips)
1 Small pointed Exacto knife blade or similar (for extracting broken wires from above)
2 1 Ohm ½ Watt resistors
2 47 Ohms ½ Watt resistors
2 100 Ohm, ½ Watt resistors
2 150 Ohm, ½ Watt resistors
2 220 Ohm, ½ Watt resistors
2 680 Ohm, ¼ Watt resistors (and below are also 1/4W)
note: Bill Schlosser has advocated using ½ Watt resistors in EE283, since they are larger and easier to read. That is true. However, for certain applications such as dense wiring of resistors to 74LS47 7 segment displays the ¼ Watt resistors fit better and are neater. Also, the stripped wire insulation slides easily over the leads. So, for the list below, I'd stay with ¼ Watt for the 330 and 470 Ohm resistors, and 1K and 10K's, which are typically used this way, and perhaps use 1/2W for the 1.2K to 6.8K. On the other hand, it's only at the beginning of EE283 that this is a significant issue; we can do all 1/4W resistors now for these larger (100 Ohm up) values.
10 330 Ohm, ¼ Watt resistors
10 470 Ohm, ¼ Watt resistors
(note: 1K resistors are in the EE241 kit.)
2 1.2K Ohm resistors
2 1.5K Ohm resistors
2 2.0K Ohm resistors
2 2.2K Ohm resistors
2 2.7K Ohm resistors
2 3.3K Ohm resistors
2 4.7K Ohm resistors
2 6.8K Ohm resistors
10 10K Ohm resistors
2 33K Ohm resistors
2 100K Ohm resistors
2 1M Ohm resistors
2 10M Ohm resistors
4 10 uF aluminum electrolytic capacitors, 50V
2 100uF aluminum electrolytic capacitors, 50V
1 1000uF aluminum electrolytic capacitors, 25V or 35V (50V is usually too expensive.)
1 100pF ceramic disk capacitor

2	.001uF capacitor (mylar) (this and below typically 50V but less down to 35V is OK.)
2	.01uF capacitor (mylar)
1	.022 uF capacitor (mylar)
1	.047 uF capacitor (mylar)
2	.1 uF capacitor (mylar)
1	.22uF capacitor (mylar)
1	.47uF capacitor (mylar)
1	1uF capacitor (mylar)
2	LM741N op-amps (or uA741 etc.)
2	LM555N timer IC's
1	4 x AA battery holder (for 6V)
2	1K Ohm potentiometer
1	10K Ohm potentiometer
1	50K trimpot (typically square, cermet, ½ Watt)
5	1N4004 diodes (or 1N4005 etc. if cheaper)
2	5.1V Zener diode
1	DIP switch (8 to 12 position)

EGR222 Lab Kit

I can't find an electronic copy of lab kit listings. I'm doing this listing based on parts order that I did find from recent years, and from considering the lab exercises to be done. (We try hard to find inexpensive motors and power supplies.)

1 Power supply, 12V to 13.6V or so at 3-4A for motors. This can be a switching supply. (may need to order separate power cord for it.)
2 Identical 12 to 24V permanent magnet DC motors, shaft size compatible with hubs.
1 12 to 24V brushless DC motor, shaft size compatible with hub
1 Unipolar stepper motor. (Does not have to be compatible with hubs, but that would be nice. These often have a gear mounted on the shaft' that's OK. "Unipolar" means 6 wires: there is a center tap on each of the two phase windings. Bipolar is only 4 wires – no center tap. Typically we will operate the stepper motor at 5V.)
2 hubs (for mechanical link between motors)
1 rubber spider (for hubs)
1 Allen wench or whatever needed for the hub setscrews

4 TIP-31 NPN Power transistors, TO-220. Can be TIP-31C etc.
4 TIP-32 PNP Power transistors, TO-220. Can be TIP-32C etc.
4 PN2222 NPN transistors (or PN2222A etc.)
4 PN2907 PNP transistors (or PN2907A etc.)
4 Heat sinks for TO-220 package; small ones able to handle about 1W to 2W.
Nuts and screws for above (I like to use 6/32, essentially tapping a hole for the screw. But smaller allows the screw to go through the hole without forcing it. We do not need insulating hardware or heat sink grease.)
1 Small breadboard for the power electronics – usually an unmounted component strip.

1 CdS photocell (we've ordered: CDS Photocell CDS0018001)
2 Phototransistor (we've ordered: Phototransistor-LTR-301)
1 NTC Thermistor NTC-502 5K
1 7406 Hex inverter/driver, O.C. (30V)
1 Hall sensor (usually a small 3 or 4 terminal device, fairly inexpensive, works on 5-15V)
5 1 Ohm 1/2W resistors (we will use these in parallel to get .2 Ohms – we used to use five 2.2 Ohm resistors instead, but this is better. These can later be used in EE252.)

Note: In the past we have used thermocouples, thermometers, ice buckets, beakers, and heaters that have been made available for the temperature sensing lab. For the LVDT lab we have used the collection of LVDT's available in SLC125. Hopefully these will be available to the EE sections. If not, we'll have to adjust.

In the past, we have used the NXP/Freescale S08QG8 Microcontroller kits. If these are not going to be available to us, we'll need to look for something different (SH8?) or more of the same. We should make sure to have a few extra kits and several extra microcontrollers. For the EE version of EGR222 we will want to have a serial port cable for each. (We should have lots of those.) The microcontrollers are expected to be used no earlier than about 1/3 of the way through the course, assuming things go normally.

We need a generous supply of hook-up wire in various colors available for EE241 and EGR222.