

Components required per group for each laboratory

ECE 327: *Electronic Devices and Circuits Laboratory I*

Abstract

This document lists the components required for the smooth execution of every laboratory in the class. Students are *not* required to purchase these components; they are stocked within the laboratory.

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Lab 1: Bipolar Junction Transistor

Total components required for this lab (per group)

Quantity	Component
1	Large ceramic disc capacitor — 470 nF (code: 474, 470n, or 0.47MF) to 1 μ F (code: 105 or 1MF) range
2	1 k Ω (code: brown - black - red or 102) resistor
2	5.6 k Ω (code: green - blue - red or 562) resistor
1	10 k Ω (code: brown - black - orange or 103) resistor
1	Resistor in neighborhood of 1 k Ω (code: brown - black - red or 102), 2.2 k Ω (code: red - red - red or 222), or 5.6 k Ω (code: green - blue - red or 562)
2	Large resistor in neighborhood of 100 k Ω (code: brown - black - yellow or 104), 220 k Ω (code: red - red - yellow or 224), or 560 k Ω (code: green - blue - yellow or 564)
1	Moderately-sized potentiometer in neighborhood of 20 k Ω (code: 203), 50 k Ω (code: 503), or 100 k Ω (code: 104)
1	2N3904 NPN BJT
1	2N3906 PNP BJT
3	1N914 generic small-signal silicon diode (alternates: 1N914A, 1N914B, or 1N4148)

Lab 2: Field Effect Transistor**Total components required for this lab (per group)**

Quantity	Component
1	1 nF (code: 102, 1n, or 0.001MF) capacitor
1	10 nF (code: 103, 10n, or 0.010MF) capacitor
4	100 nF (code: 104, 100n, or 0.10MF) capacitor
4	1 μ F (code: 105 or 1MF) capacitor
3	1 k Ω (code: brown -black - red or 102) resistor
1	1.5 k Ω (code: brown - green - red or 152) resistor
2	10 k Ω (code: brown - black - orange or 103) resistor
1	555 timer (e.g., LM555 or NE555)
1	CD4007 CMOS dual complementary pair plus inverter
1	CD4049 CMOS inverter
1	CD4066 CMOS switch (very fragile; keep extras)
1	Generic operational amplifier (LF351 or LM741)

Lab 3: Voltage Regulators

Total components required for this lab (per group)

Quantity	Component
1	100 nF (code: 104, 100n, or 0.10MF) capacitor
1	1 μ F (code: 105 or 1MF) capacitor
1	15 Ω (code: brown-green-black or 150 or 15R0) resistor
2	22 Ω (code: red-red-black or 220 or 22R0) resistor
1	56 Ω (code: green-blue-black or 560 or 56R0) resistor
1	100 Ω (code: brown-black-brown or 101) resistor
1	150 Ω (code: brown-green-brown or 151) resistor
1	180 Ω (code: brown-gray-brown or 181) resistor
1	220 Ω (code: red-red-brown or 221) resistor
1	390 Ω (code: orange-white-brown or 391) resistor
1	470 Ω (code: yellow-violet-brown or 471) resistor
2	560 Ω (code: green-blue-brown or 561) resistor
1	680 Ω (code: blue-gray-brown or 681) resistor
1	820 Ω (code: gray-red-brown or 821) resistor
2	1 k Ω (code: brown-black-red or 102) resistor
1	1.5 k Ω (code: brown-green-red or 152) resistor
1	2.2 k Ω (code: red-red-red or 222) resistor
1	3.9 k Ω (code: orange-white-red or 392) resistor
1	6.8 k Ω (code: blue-gray-red or 682) resistor
2	10 k Ω (code: brown-black-orange or 103) resistor
2	Potentiometer in neighborhood of 2 k Ω (code: 202), 5 k Ω (code: 502), or 10 k Ω (code: 103)
3	2N3904 NPN BJT
1	LM317 3-terminal adjustable voltage regulator

Components that need to be available in the room (per group)

Quantity	Component
1	Adjustable resistance box (e.g., “decade” or “substitution” box)
1	Zener diode (1N4731, 1N5229, or 1N751)

Lab 4: Oscillators

Total components required for this lab (per group)	
Quantity	Component
3	100 pF (code: 101, 100, or 100p) capacitor
3	1 nF (code: 102, 1n, or 0.001MF) capacitor
2	2.2 nF (code: 222, 2n2, or 0.0022MF) capacitor
1	3.3 nF (code: 332, 3n3, or 0.0033MF) capacitor
3	10 nF (code: 103, 10n, or 0.010MF) capacitor
1	22 nF (code: 223, 22n, or 0.022MF) capacitor
1	47 nF (code: 473, 47n, or 0.047MF) capacitor
3	100 nF (code: 104, 100n, or 0.10MF) capacitor
2	470 nF (code: 474, 470n, or 0.47MF) capacitor
1	1 μ F (code: 105 or 1MF) capacitor
1	1 k Ω (code: brown - black - red or 102) resistor
1	1.8 k Ω (code: brown - gray - red or 182) resistor
1	3.3 k Ω (code: orange - orange - red or 332) resistor
1	3.9 k Ω (code: orange - white - red or 392) resistor
1	5.6 k Ω (code: green - blue - red or 562) resistor
1	6.8 k Ω (code: blue - gray - red or 682) resistor
1	10 k Ω (code: brown - black - orange or 103) resistor
1	22 k Ω (code: red - red - orange or 223) resistor
1	50 k Ω (code: green - black - orange or 503) resistor
1	555 timer (e.g., LM555 or NE555)
1	LF351 operational amplifier
1	LM741 operational amplifier

Lab 5: Analog-to-Digital Conversion**Total components required for this lab (per group)**

Quantity	Component
1	2.2 nF (code: 222, 2n2, or 0.0022MF) capacitor
6	100 nF (code: 104, 100n, or 0.10MF) capacitor
1	Large ceramic disc capacitor — 470 nF (code: 474, 470n, or 0.47MF) to 1 μ F (code: 105 or 1MF) range
1	470 Ω (code: yellow violet brown or 471) resistor
1	560 Ω (code: green blue brown or 561) resistor
4	1 k Ω (code: brown black red or 102) resistor
2	1.5 k Ω (code: brown green red or 152) resistor
1	8.2 k Ω (code: gray red red or 822) resistor
1	5 k Ω (code: 502) potentiometer
2	Moderately-sized potentiometer in neighborhood of 20 k Ω (code: 203), 50 k Ω (code: 503), or 100 k Ω (code: 104)
1	10 k Ω (code: 103) potentiometer
1	Large potentiometer in neighborhood of 200 k Ω (code: 204), 500 k Ω (code: 504), or 1 M Ω (code: 105)
1	CD4027 JK-type flip-flop (or CD4013 D-type flip-flop)
1	CD4066 CMOS switch (very fragile; keep extras)
1	LM311 open-collector voltage comparator
1	2N3906 PNP BJT
3	1N914 generic small-signal silicon diode (alternates: 1N914A , 1N914B , or 1N4148)
1	Generic operational amplifier (LF351 or LM741)

Lab 6: Digital-to-Analog Conversion

Total components required for this lab (per group)

Quantity	Component
2	100 pF (code: 101, 100, or 100p) capacitor
1	2.2 nF (code: 222, 2n2, or 0.0022MF) capacitor
8	100 nF (code: 104, 100n, or 0.10MF) capacitor
1	1 μ F (code: 105 or 1MF) capacitor
1	180 Ω (code: brown-gray-brown or 181) resistor
1	220 Ω (code: red-red-brown or 221) resistor
1	470 Ω (code: yellow-violet-brown or 471) resistor
1	560 Ω (code: green-blue-brown or 561) resistor
3	1 k Ω (code: brown-black-red or 102) resistor
4	1.5 k Ω (code: brown-green-red or 152) resistor
1	8.2 k Ω (code: gray-red-red or 822) resistor
1	10 k Ω (code: brown-black-orange or 103) resistor
1	5 k Ω (code: 502) potentiometer
1	Moderately-sized potentiometer in neighborhood of 20 k Ω (code: 203), 50 k Ω (code: 503), or 100 k Ω (code: 104)
1	10 k Ω (code: 103) potentiometer
1	Potentiometer in neighborhood of 2 k Ω (code: 202), 5 k Ω (code: 502), or 10 k Ω (code: 103)
1	CD4049 CMOS inverter
2	CD4066 CMOS switch (very fragile; keep extras)
1	2N3904 NPN BJT
2	2N3906 PNP BJT
3	1N914 generic small-signal silicon diode (alternates: 1N914A, 1N914B, or 1N4148)
1	LM317 3-terminal adjustable voltage regulator
3	CA3160 operational amplifier (or CA3130 with 45–100 pF capacitor (frequency compensation for stability) — 47 pF (code: 47 or 47p) or 68 pF (code: 68 or 68p) work well)
1	QEE113 infrared LED
1	QSE157 infrared totem-pole TTL photosensor

Lab 7: Project Integration and Debugging

Total components required for this lab (per group)

Quantity	Component
2	470 pF (code: 471, 470, or 470p) capacitor
1	4.7 nF (code: 472, 4n7, or 0.0047MF) capacitor
1	47 nF (code: 473, 47n, or 0.047MF) capacitor
6	100 nF (code: 104, 100n, or 0.10MF) capacitor
2	470 nF (code: 474, 470n, or 0.47MF) capacitor
2	1 μ F (code: 105 or 1MF) capacitor
1	Electrolytic capacitor in neighborhood of 1 μ F (code: 105 or 1MF) to 10 μ F (code: 106 or 10MF)
1	Large electrolytic capacitor in neighborhood of 100 μ F (code: 107 or 100MF) to 470 μ F (code: 477 or 470MF)
1	4.7 Ω (code: yellow-violet-gold or 4R7) resistor
1	100 Ω (code: brown-black-brown or 101) resistor
1	330 Ω (code: orange-orange-brown or 331) resistor
1	470 Ω (code: yellow-violet-brown or 471) resistor
1	560 Ω (code: green-blue-brown or 561) resistor
1	680 Ω (code: blue-gray-brown or 681) resistor
1	820 Ω (code: gray-red-brown or 821) resistor
5	1 k Ω (code: brown-black-red or 102) resistor
1	1.8 k Ω (code: brown-gray-red or 182) resistor
2	4.7 k Ω (code: yellow-violet-red or 472) resistor
1	6.8 k Ω (code: blue-gray-red or 682) resistor
1	8.2 k Ω (code: gray-red-red or 822) resistor
1	10 k Ω (code: brown-black-orange or 103) resistor
2	18 k Ω (code: brown-gray-orange or 183) resistor
1	22 k Ω (code: red-red-orange or 223) resistor
1	33 k Ω (code: orange-orange-orange or 333) resistor
2	Resistor in neighborhood of 1 Ω (code: brown-black or 1R0) to 10 Ω (code: brown-black-black or 100 or 10R0) (or pairs of 12 Ω (code: brown-red-black or 120 or 12R0) to 18 Ω (code: brown-gray-black or 180 or 18R0) in parallel)
1	500 Ω (code: 501) potentiometer
1	1 k Ω (code: 102) potentiometer
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Quantity	Component
1	5 k Ω (code: 502) potentiometer
1	Moderately-sized potentiometer in neighborhood of 20 k Ω (code: 203), 50 k Ω (code: 503), or 100 k Ω (code: 104)
1	10 k Ω (code: 103) potentiometer
1	Potentiometer in neighborhood of 2 k Ω (code: 202), 5 k Ω (code: 502), or 10 k Ω (code: 103)
4	2N3904 NPN BJT
3	2N3906 PNP BJT
2	1N914 generic small-signal silicon diode (alternates: 1N914A , 1N914B , or 1N4148)
1	CA3160 operational amplifier (or CA3130 with 45–100 pF capacitor (frequency compensation for stability) — 47 pF (code: 47 or 47p) or 68 pF (code: 68 or 68p) work well)
3	Generic operational amplifier (LF351 or LM741)

Components that need to be available in the room (per group)

Quantity	Component
1	8 Ω speaker (or 4 Ω speaker with 12 Ω 12 Ω 12 Ω for current limiting)

Complete list of components required per group

Components required for each *one* of all groups across all sections

Because components can carry from one class to the next, the lab should have a stock of enough for every section of the class (e.g., **15 groups** from 3 sections of 5 groups).

Quantity	Component
4	100 pF (code: 101, 100, or 100p) capacitor
2	470 pF (code: 471, 470, or 470p) capacitor
3	1 nF (code: 102, 1n, or 0.001MF) capacitor
4	2.2 nF (code: 222, 2n2, or 0.0022MF) capacitor
1	3.3 nF (code: 332, 3n3, or 0.0033MF) capacitor
1	4.7 nF (code: 472, 4n7, or 0.0047MF) capacitor
3	10 nF (code: 103, 10n, or 0.010MF) capacitor
1	22 nF (code: 223, 22n, or 0.022MF) capacitor
1	47 nF (code: 473, 47n, or 0.047MF) capacitor
24	100 nF (code: 104, 100n, or 0.10MF) capacitor
4	470 nF (code: 474, 470n, or 0.47MF) capacitor
5	1 μ F (code: 105 or 1MF) capacitor
1	Large ceramic disc capacitor — 470 nF (code: 474, 470n, or 0.47MF) to 1 μ F (code: 105 or 1MF) range
1	Electrolytic capacitor in neighborhood of 1 μ F (code: 105 or 1MF) to 10 μ F (code: 106 or 10MF)
1	Large electrolytic capacitor in neighborhood of 100 μ F (code: 107 or 100MF) to 470 μ F (code: 477 or 470MF)
1	4.7 Ω (code: yellow violet gold or 4R7) resistor
1	15 Ω (code: brown green black or 150 or 15R0) resistor
2	22 Ω (code: red red black or 220 or 22R0) resistor
1	56 Ω (code: green blue black or 560 or 56R0) resistor
1	100 Ω (code: brown black brown or 101) resistor
1	150 Ω (code: brown green brown or 151) resistor
1	180 Ω (code: brown gray brown or 181) resistor
1	220 Ω (code: red red brown or 221) resistor
1	330 Ω (code: orange orange brown or 331) resistor
1	390 Ω (code: orange white brown or 391) resistor
3	470 Ω (code: yellow violet brown or 471) resistor
3	560 Ω (code: green blue brown or 561) resistor
1	680 Ω (code: blue gray brown or 681) resistor
1	820 Ω (code: gray red brown or 821) resistor
16	1 k Ω (code: brown black red or 102) resistor
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Quantity	Component
7	1.5 k Ω (code: brown green red or 152) resistor
1	1.8 k Ω (code: brown gray red or 182) resistor
1	2.2 k Ω (code: red red red or 222) resistor
1	3.3 k Ω (code: orange orange red or 332) resistor
1	3.9 k Ω (code: orange white red or 392) resistor
2	4.7 k Ω (code: yellow violet red or 472) resistor
2	5.6 k Ω (code: green blue red or 562) resistor
2	6.8 k Ω (code: blue gray red or 682) resistor
3	8.2 k Ω (code: gray red red or 822) resistor
5	10 k Ω (code: brown black orange or 103) resistor
2	18 k Ω (code: brown gray orange or 183) resistor
1	22 k Ω (code: red red orange or 223) resistor
1	33 k Ω (code: orange orange orange or 333) resistor
1	50 k Ω (code: green black orange or 503) resistor
	Resistor in neighborhood of
	1 Ω (code: brown black or 1R0)
	to
2	10 Ω (code: brown black black or 100 or 10R0)
	(or pairs of
	12 Ω (code: brown red black or 120 or 12R0)
	to
	18 Ω (code: brown gray black or 180 or 18R0) in parallel)
	Resistor in neighborhood of
1	1 k Ω (code: brown black red or 102),
	2.2 k Ω (code: red red red or 222), or
	5.6 k Ω (code: green blue red or 562)
	Large resistor in neighborhood of
2	100 k Ω (code: brown black yellow or 104),
	220 k Ω (code: red red yellow or 224), or
	560 k Ω (code: green blue yellow or 564)
1	500 Ω (code: 501) potentiometer
1	1 k Ω (code: 102) potentiometer
3	5 k Ω (code: 502) potentiometer
4	Moderately-sized potentiometer in neighborhood of
	20 k Ω (code: 203), 50 k Ω (code: 503), or 100 k Ω (code: 104)
3	10 k Ω (code: 103) potentiometer
3	Potentiometer in neighborhood of
	2 k Ω (code: 202), 5 k Ω (code: 502), or 10 k Ω (code: 103)
1	Large potentiometer in neighborhood of
	200 k Ω (code: 204), 500 k Ω (code: 504), or 1 M Ω (code: 105)
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Quantity	Component
1	555 timer (e.g., LM555 or NE555)
1	CD4007 CMOS dual complementary pair plus inverter
1	CD4027 JK-type flip-flop (or CD4013 D-type flip-flop)
1	CD4049 CMOS inverter
3	CD4066 CMOS switch (very fragile; keep extras)
1	LM311 open-collector voltage comparator
6	2N3904 NPN BJT
6	2N3906 PNP BJT
8	1N914 generic small-signal silicon diode (alternates: 1N914A , 1N914B , or 1N4148)
2	LM317 3-terminal adjustable voltage regulator
4	CA3160 operational amplifier (or CA3130 with 45–100 pF capacitor (frequency compensation for stability) — 47 pF (code: 47 or 47p) or 68 pF (code: 68 or 68p) work well)
4	Generic operational amplifier (LF351 or LM741)
1	LF351 operational amplifier
1	LM741 operational amplifier
1	QEE113 infrared LED
1	QSE157 infrared totem-pole TTL photosensor

Components that need to be present in the laboratory room (per group)

These components are only used during the laboratory experience. They are replaced at the end of every class, and so the lab stock needs to stock only enough for every group of the *largest section* (e.g., **5 groups**).

Quantity	Component
1	Adjustable resistance box (e.g., “decade” or “substitution” box)
1	8 Ω speaker (or 4 Ω speaker with 12 Ω 12 Ω 12 Ω for current limiting)
1	Zener diode (1N4731 , 1N5229 , or 1N751)