# Ceiling Fan Lab

**Program:** Electrician Technician

**Course:** EL140 Residential Applications

**Objectives:** Under the supervision of your instructor, you should be able to do the following:

- Layout, wire, and install a ceiling fan

**Lab Equipment:**

- Residential Lab Bays

**Required Tools:**

- 1 - Six-foot step ladder
- 1 - 4-in-1 screwdriver
- 1 - Hammer
- 1 - Torpedo Level
- 1 - Needle-nose pliers
- 1 - Non-contact voltage tester
- 1 - Nut driver
- 1 - Tape measure
- 1 - Wire stripper/cutter
- 1 - Wrench set

**Materials:**

- 1 – service panel
- 1 – 15-amp single breaker
- 1 - Ceiling fan
- 1 - Fan brace assembly new construction
- 1 - Switch
- 1 - two gang side nail box
- 15-Romex staples
- 7- wire nuts
- 12’- 14/3 Romex
- 12’- 14/2 Romex

**Safety (PPE):**

- Safety glasses/goggles
- Hard hat

**Resources:** N/A

**Required Time:** One Day

**Shop Maintenance:**

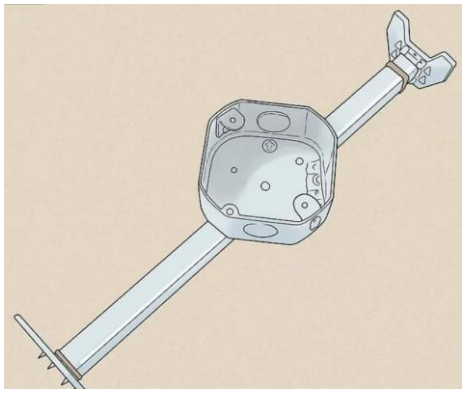
- All work will cease 20 minutes prior to the end of class.
- All work areas must be cleaned.
- Tools and equipment must be cleaned and returned to the designated areas (cage, tool room, cabinets etc.)
- Any broken or missing tools must be reported immediately.
- Tools and equipment are students' responsibility

**Procedures:** *(Eye protection must always be worn, and power must be turned off till testing)*

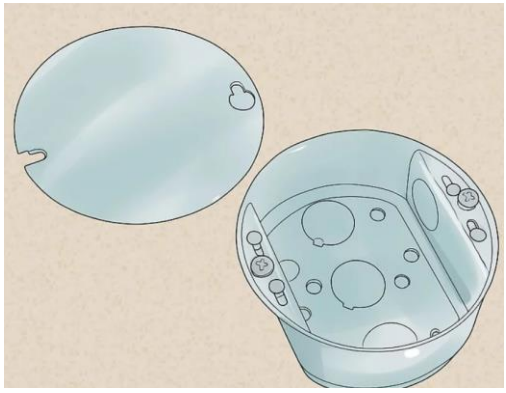
1- Turn the electricity off at the circuit breaker box. When working with electricity or wiring, you should always cut power to the area before you touch anything else. Locate the circuit breaker box in your home and turn off the power to the room or area your fan will be installed in.

2- Install one single gang box, 45" to top of box, on one side of the residential bay.

3- Choose a fan box with a hanger bar if the fixture is between two ceiling joists. A hanger bar is an extendable rod that will hold taut between two ceiling joists and give you something to attach the fan to.



4- Choose a screw-fastening fan box if you have access to a single ceiling joist. If the opening in your ceiling is directly below some wooden framing, use a fan box that can be screwed directly into the framing.



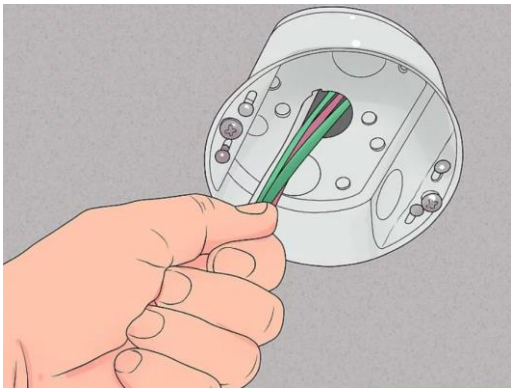
5- Install the box

6- Run 14/2 Romex from power source to the single gang box. Do not connect the cable to the breaker panel yet. You'll do this at the end of the project.

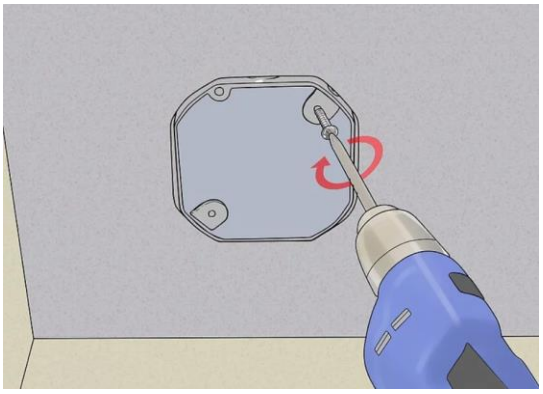
7- Run the 14/3 Romex, through the pre-drilled holes from one single gang box to the ceiling fan box leaving about 12" of wire at each end.

8- Staple Romex to studs.

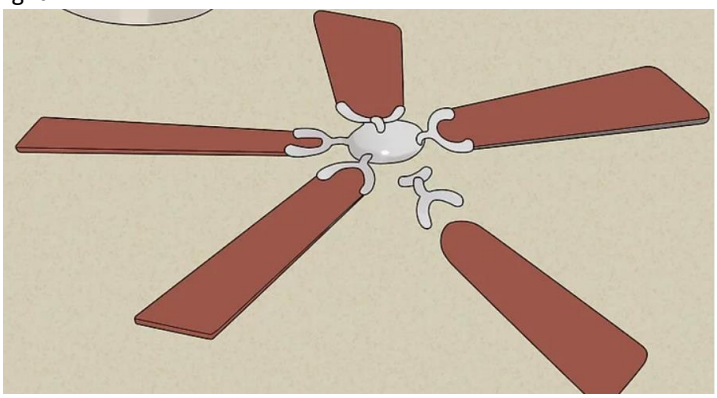
9- If in Drywall, Feed the cables through the new electrical box. Lift the new ceiling box towards and into the ceiling. As you do so, thread the wiring coming from the ceiling through the central hole in the ceiling box.
   a. If the fan box comes with a cable clamp, thread the wiring through this as well. Push it over the wires until it sits on the face of the fan box and tighten the screws on the cable clamp to hold the wires in place.



10- Secure the fan-rated ceiling box in place. If you have a fan box that attaches directly to a ceiling joist, hold the box against the joist and use the provided screws to fasten it in place. If you need a hanger bar, position the bar between the two joists. Use an adjustable wrench to rotate the bar and extend it, rotating until the bar is held securely in place between the two joists. Follow the manufacturer's instructions to attach the fan box to the hanger bar.



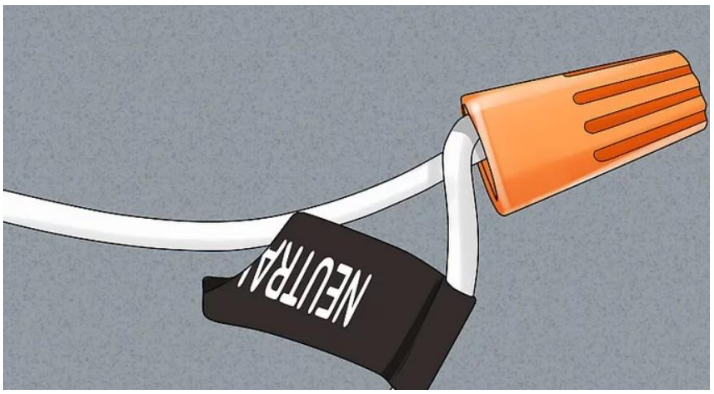
11- Attach the ceiling plate or bracket. The ceiling plate or fan bracket is the fixture that your fan will be suspended from. Hold the ceiling plate up to the fan box and pull all the wires through the hole in its center. Use the provided screws to tightly secure the ceiling plate in place.
    a. Always follow the manufacturer's instructions when working with specific parts. The method for attaching ceiling plates and brackets may vary, but it needs to be done correctly to keep the fan attached to the ceiling.
12- Assembling the ceiling fan.



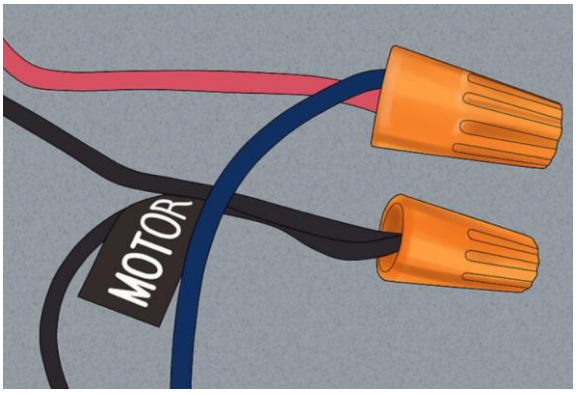
13- Attach the down rod to the fan body. The down rod is a long metal pipe that is used to distance the fan from the ceiling. Keeping the body of the fan on the ground, thread the wires attached to the fan through the down rod. Sit the down rod in place on the top of the fan body. Tighten the locking screws around the base of the down rod until it is securely attached to the fan body. Tie-off the grounds in each box

14- Lift the fan up to the ceiling. Use a ladder or stepladder to carefully lift the fan assembly up towards the ceiling. Most fans will have some method to suspend them just below the ceiling while you connect the wiring. If your fan does not, ask someone else to hold the fan in place as you do so.

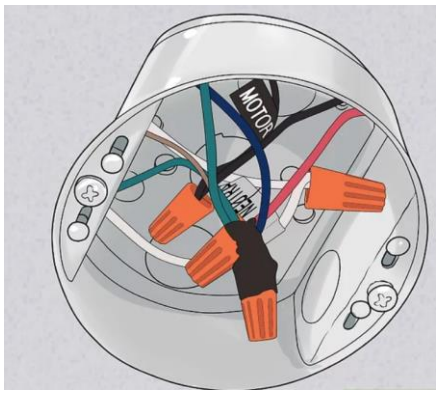
15- Connect the neutral wires. The neutral wire provides a return path for the current coming into the fan and will usually have a white insulate covering. Hold the two neutral wires together and twist the stripped ends together. Use a plastic wire connector to hold them together and secure it with electrical tape.



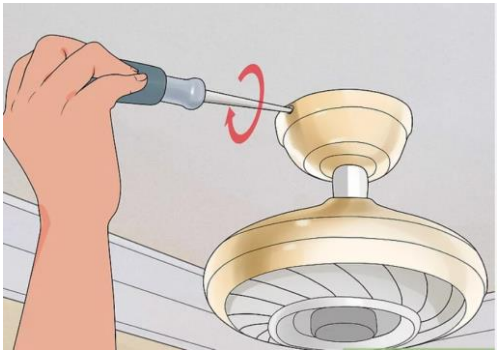

16- Connect the ground wires. The ground wire will usually be green or entirely bare and is used to prevent electrical shocks. Find the two ground wires, twist them together and secure with a plastic wire connector. Use electrical tape to keep the wires and the connector in place.
    a. Make sure the ground wire coming from the ceiling is attached to the ground screw in your fan box, as this connection is crucial for the ground wire to serve its purpose. If you don't have a ground screw, or you don't know how to ground a wire, call a licensed electrician.



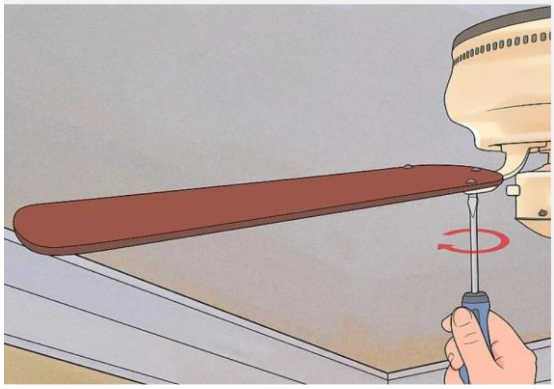
17- Connect the remaining wires together per color. Any remaining wires will be hot wires, used to provide power to the fan and any light fittings attached to it. These will usually be black and red but may be a different color in different wiring schemes. Twist the remaining wires together and secure them with a plastic wire connector and electrical tape.
    a. This method will make one switch control the fan and one switch control the light.
18- Tuck the wires into the fan box. Carefully push the wires coming from the ceiling back into the fan box to secure them. As you do, make sure the wire connectors and electrical tape stay secure and no wiring is exposed.




19- Screw the canopy over the fan box. The canopy will lift from the down rod and cover the wiring and socket used to hold the fan in place. Use the provided screws to secure the canopy to the fan box and keep the fan together.



20- Attach the fan blades. One by one, lift the fan blades up to their mountings on the fan motor. Slot them into place according to the manufacturer's guide and use the provided screws to tightly secure them to the motor.



21- Once the ceiling fan is complete, wire the two switches and secure them in the 2-gang box

22- Trun on the power and check to make sure the first switch closest to the opening of the bay is the light and the second switch is the fan. (The light should always be the first switch when entering a room.

23- Troubleshoot any problems if they occur.