My answer: Well, let’s start with this assumption — things happen. Ok, but why do they happen? For example, “I got in a car wreck today.” That’s a thing. “Why did I get in a car wreck today?”

1. At one end of the spectrum, we could say that there is no reason. Things happen spontaneously and totally at random. That could be true, but it just feels contrary to what most of us feel and observe all day every day. That doesn’t necessarily make it untrue, but at the very least, that theory is not useful for this course. If that were, in fact, true then there would be no reason to learn any of the other things we are going to learn in this course and you should not pay your tuition. More importantly, there are typically two main reasons for asking the question above, “Ok, but why do they happen?”
   1. The first reason is to predict (formally or intuitively) if or when a similar thing will happen again. For example, “will I, or someone I care about, get in another car wreck tomorrow?”
   2. The second reason is to try to control if or when a similar happens again. For example, “what can I do to prevent myself or someone I care about from getting in a car wreck tomorrow?” In epidemiology, the first reason we might simply call prediction and the second reason we often call an intervention. And, if things happen spontaneously and totally at random, then by definition, we can’t predict or control them.
2. An alternative explanation might be called predetermination. That is, things don’t happen at random. There is a reason. But, that reason, is unobservable (from the viewpoint of Western science) and uncontrollable. So, here we wouldn’t conclude that my car wreck today is spontaneous or random, but we would conclude that no matter what else happens, I will be in a car wreck today. So, this could also be true. But, again, if it is, then we still can’t really predict or intervene on things so there is no real reason to move past this point in the course.
3. Yet another explanation (sometimes called a theory) is what we will refer to causation. That is, thing 2 (effect) happened because thing 1 (cause) happened. And this is where it gets interesting. First of all, the statement above, “thing 2 (effect) happened because thing 1 (cause) happened,” implies that if thing 1 hadn’t happened then thing 2 also wouldn’t have happened. In this course, we will call that counterfactual theory. Of course, real life is complicated and logical next questions may be: “If I see thing 2 happen, how do I figure out what thing 1 was?”, and “how do I know thing 2 wouldn’t have happened if thing 1 hadn’t happened?”, and “does thing 2 always happen after thing 1 or just sometimes?”, and “if I can figure out what thing 1 was and I do believe that thing 2 is likely to happen after thing 1, then what can I do about it?” For example, “How do I know I wouldn’t have gotten in a car wreck if I hadn’t run that red light? Maybe my steering system would have failed at the exact same moment and I still would have wrecked.” These are the kinds of questions we attempt to formalize (i.e., make measurable) and answer with the sufficient-component cause model and with causal diagrams. Together, counterfactuals, sufficient-component cause models, and causal diagrams my be grouped under the theory of causal inference — or why do things happen. Understanding why they happen, how to predict them, and how to control them are the basic foundational questions to all of epidemiology, and the desire to answer them is the cause (you see what I did there?) of all the concepts and methods we will learn in this course.