Hello, this is Principles of Engineering System unit, learning outcome 8 about system responses.

Our example here is for temperature in an electric oven. We want to have the temperature going to 180 degrees which is the set point.

There are three system responses shown in red, green and blue.

So this is how a system might respond, so if we follow the blue line up. It ramps up, goes passed the set point to a peak and then it oscillates with the magnitude decreasing with time. This response is underdamped, can also be called an oscillating response as it is going up and down. The other responses are not oscillating, the other extreme is that the response is overdamped, so it is a very stiff system, it is very slow at getting to the set point.

In the middle we have something that goes up reasonably quick and gets close to the set point.

This is a temperature response we have demonstrated here but it could be other control variables such as position and speed for example, it is always against time. The slope of the response at the start is the rate of change – how quick it is getting there.

A further video will follow on analysing underdamped systems responses, so we can compare different responses

Thank you for listening.