DC verses DCC.

The Meaning:

DC = Direct Current

The instructions sent from the 'Controller' are to vary the voltage to the track, this either speeds up the Locomotive or slows it down.

DCC = Digital Command Control

The instructions are sent from the 'Controller' to the decoder on the Locomotive by means of digital signals that are superimposed over a constant track voltage. Put simply, you control the locomotive and not the track.

DC System

The DC System has been around since the 60's and is probably the most common system used, due to the fact it's been around so long.

You cannot successfully run two trains on the same track. I say successfully because you can run 2 trains on one track, the problem is that depending on the motors and load they may well catch each other up, because they are both getting the same amount of voltage. There is no way to control them separately.

Each track circuit will require its own Speed controller, and each junction between tracks will require Isolators otherwise all trains will move in the same direction when power is applied to the track. This is why most points, even today, isolate the straight from the turn out, hence the reason you need to fit shorting clips to existing points to run DCC.

You cannot run Interior Carriage lights on a DC system as they will go out when the train is stationery, or dim as the train slows down, you would have to fit a little battery pack inside the carriage.

The Points, Turntables and any ancillary equipment requires a separate power source of 12 - 16v DC in most cases, this entails a bank of switches to control these items.

This being said you can run many trains on a DC system as long as each set of tracks has a separate speed controller. So you could have 4 circular tracks with a train running on each, with each going at different speeds and directions, also work a shunting (fiddle) yard at the same time, as long as each is isolated from the other by points of isolating track. This is where your bank of switches come in to control the points and Isolating track.

DCC System

The DCC System was first introduced in the 70's but was not very good so did not last long. The next generation has been around since the 90's.

In a DCC system the complete layout is live at 12v DC and this voltage does not vary, what does vary is the signal that is piggy backed on the voltage.

Each Locomotive, set of points, and controllable item has a 'Decoder'. Each decoder has a specific address which you create with the control station. So now the controller knows all the addresses of each Locomotive, set of points, and so on. The decoder on the Locomotive reads the instruction, checks it is for that Loco, and acts on the instruction.

This means you could have more than one train on the same line, you could have one train in the station and another approaching the station, or you could reverse one train on the same line as a train is going forward?

The fiddle yard can be worked with more than one train at the same time, as long as you have eyes in the back of your head.

It does away with the banks of switches, and electronic circuits to control this and that.

The complete layout can be run from a computer or android with a display of your layout in real time.

Pros & Cons:

DC System Pros:

It's been around a long time and is tried and tested.

Requires research if you want to do something out of the ordinary.

Cost is less than DCC

Very hands on.

It's more like the real thing if you are into steam Locos

Cons:

There is a mass of wiring under the baseboard.

You have a bank of switches that need to be labelled otherwise chaos.
Each track is almost like a separate system within your layout.

DCC System Pros:
A lot less wiring, requires a Bus Bar and spurs to each piece of equipment (Points etc)
More control of Locomotives and ancillary equipment
Computer control, therefore you are able to create complete scenarios of your layout.
Most old Locomotives can be fitted with a decoder.

Cons:
The major downside is the cost. The average cost of a controller is around £200, but they are on the way down.
Each Locomotive, set of Points, etc will cost around £15.00 for each decoder.
The decoder cost is on top of your normal layout costs.

This is a very brief description of the two systems, there are thousands of pages on the web about both types.

For what it's worth I am a traditionalist and therefore would go for the DC system. Part of the magic of a Model Rail system is the fiddling which never ends with a DC system, you do however need a greater knowledge of Electricity and Electronics.