Direct Measurement of Bulk Density

Bulk density is inversely related to porosity and related to water flow near the soil surface. It is defined as:

$$\rho_b\ (bulk\ density) = \frac{Ms}{V_T}$$

Where M_s is the mass of the solids (dry mass) and V_T is the total volume.

In the field

1. Using a core with a known volume of 147.26cm³ hammer the core (using a piece of wood) into the soil at the depth at which you want to measure bulk density.
2. Place soil sample into a ziplock bag labeled with, sample #, depth (cm) and date. If you are trying to measure soil moisture and bulk density simulatenously, then you need to measure the mass of the sample as soon as possible so it does not dry.

In the lab

Make sure all calculations, weights, and data are entered into an excel spreadsheet.

1. Weigh of the container (pie tin or something else) that you are using to measure the sample in.
2. Place the sample in the container and take the total weight.
3. Subtract the weight of container from the weight of both sample and container combined.
    i. For example, if your container weighs 3g, and the soil + container weigh 12.5g, calculate 12.5g – 3g for a total of 9.5g. This means the actual soil weight is 9.5g.
4. Once the sample has been weighed, place it in an oven on 105˚C for at least 24 hours
5. Remove from oven and weigh the dry soil.
6. Subtract the weight of container from the weight of both wet sample and container combined.
    i. For example, if your container weighs 3g, and the soil + container weigh 9.5g, calculate 9.5g – 3g for a total of 6.5g. This means the actual dry soil weight is 6.5g.
7. Using the dry weight, calculate the density of each soil sample. The formula is **D=Mass of dry soil/Sample Volume.** The volume in this case is the volume of the core, which is 147.26cm³.