The performance of a product or processing operation depends on the properties of the materials used within them. For example, bulk powder flow through a hopper is a function of the powder’s effective internal friction angle, bulk density, and wall friction angle. Understanding how to properly describe, gather, and characterize particle and powder samples is essential for effective system and product design, and quality control.

The goal of this course is to familiarize participants with the properties and methods used to characterize the mechanical behavior of particles and powders. Discussion of where these properties have practical application will also be presented. Participants will observe a subset of the measurement methods in a laboratory setting.

At the conclusion of the course, participants should be able to:

1. Define and describe the significant properties of particles and powders,
2. Describe techniques used to measure these properties, and
3. Describe how these properties are useful in product and manufacturing performance.

The topics covered in this 1.5-day lecture and laboratory short course include:

- Sampling: sub-sampling, sampling tools, thief probe, spin riffler, chute riffler, Boerner divider, pilot plant
- Particle Characterization: size and size distributions, shape, density, surface area microscopy, sieving, laser diffraction, helium and powder pycnometry, x-ray computed tomography
- Powder Characterization: bulk density, compressibility, flow, tapped density tester, instrumented punch and die, shear cell tester, powder rheometer

CP3 is a research and education center for the manufacture of particulate products including agricultural chemicals, consumer goods, energetic materials, foods and feed, pharmaceuticals and specialty chemicals.

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*Characterization (4/23-24) and Unit Operations short courses (4/24-25) do not overlap.