I hope you enjoyed this experiment, with all these words and terms floating around -

Before we go ahead I have a book recommendation for those of you, who have an affinity to linguistics and poetry

It is this little nice book, and the title is simply “Crystallography”, published originally in 1994.

But it is not an ordinary textbook on this subject -

It’s from the internationally recognized Canadian poet Christian Bök, and it is an experimental book which deals with the language itself
In his view the language can be considered as a crystallization process...

And this is emphasized, for instance, in patterns like this, made of words, here the two words crystal and lattice, form a distinct pattern, namely a ... crystal lattice!

Well, this was of course just a side-note and now we (want to) switch over to the systematization of the content of this course....

Let’s start: The main important message is, that you will soon be able to handle all these terms without any effort!

- You will learn about the fundamental concept of the unit cell, and that this unit cell can have - only 7 principally different dimensions and angles between faces - only 7! And that these are called crystal systems, and that these are just the names for them

- You will learn how the outer shape of crystals can be described, this is the area of morphology. Morphology is Greek and means simply “study of shape”

- in this context the so-called Miller indices play a role, which are sort of orientation guide through crystals, we will address this topic, too, but only shortly

- The outer shape of crystals can also be categorized in terms of symmetry - and this will lead us to the point groups. Point group is only a different name for crystal class.

- The space group in turn is only the complete description of the symmetry of a crystal in short form (their notation is not too simple, but we will deal with that topic later)

- and the symmetry, in turn, can be described through the existence of several symmetry elements on which corresponding symmetry operations are carried out, some of them
can be seen here, we will explain all of them, not necessarily on crystals but also on objects from everyday life

- Next, the lattices are introduced - what is the relationship between the mathematical construction called a lattice and our crystals? What is represented by a lattice point? This is the motif. And the systematics of crystal lattices was elaborated by the French physicist Auguste Bravais, who showed that there are only 14 of them - we will see which ones :-) 

- to describe solid state matter there are two complementing concepts: the first one makes use of the closest packing of spheres, in which other species can be located in the voids - the second concept is based on coordination polyhedra, species that are surrounded by a certain other species to build a polyhedra. These polyhedra are in turn connected to neighboring polyhedra in a specific way, for instance edge- or face-connected. We will have a look every now and then, how these general concepts are related to each other.

- And finally we will have a look at quasicrystals! Quasicrystals were discovered by Daniel Shechtman from Israel and for his work on this topic he was awarded with the Nobel Prize in 2011, - we hope we will be able to explain, in which way quasicrystals are indeed crystals, and in which respect they are not.