MS47 New horizons in teaching crystallography in the 21st century

MS47-01
How should we teach crystallography?
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Abstract
In this talk I reflect on how we teach crystallography. As educators we perform multiple roles providing courses to undergraduates and graduates as well as explaining our crystallographic research to the public and schoolchildren. Firstly then, an audience of undergraduates in practice presents different challenges to the teacher depending on whether they are physicists, chemists or biologists; these being the specific courses I have taught in the last 40 years or so and for which I, therefore, have extensive experience. Secondly, for graduate courses, these are organized by our crystallographic societies and associations. Such courses might be tailored to a given subject, as with undergraduates, or more likely might be for a broad, across the subjects, set of students. I have also taught on and/or organized these. Thirdly, as researchers, we are increasingly called upon to explain our research to broad audiences such as of the public, and/or of school children, and these cross sections of society do not necessarily have much science training, or if they have it has been long forgotten. As educators, I am sure all of us wrestle with just how we teach our crystallography concepts in these situations. Overall, we seek to ensure trust in our results and to inspire enthusiasm for what we study. In University of Manchester Open Days to prospective students and their parents I found it important to focus on tangible examples to begin with to capture the interest of the non-expert. Also explaining the same thing with multiple media helps; physical molecular models, crystals such as calcite and quartz, molecular graphics on a laptop, as well as books and journals. Diffraction patterns are the hardest to explain, and how we use them; the microscope analogy helps a lot.

References
Helliwell, J.R. (2016) Perspectives in Crystallography Chapter 1: Explaining 'What is crystal structure analysis? for a general audience. Published by CRC Press Taylor and Francis Group, Boca Raton, Florida, USA.
Helliwell, J.R. (2021) How should we teach crystallography? A review of teaching books' contents pages, Crystallography Reviews, 27:3-4, 135-145.

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