

Poster Presentation

MS032.P05

A comprehensive crystallography class for graduate and undergraduate students

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Formal crystallography teaching in the United States has declined significantly over the past decades. Our university is fortunate to include a full-semester 4 credit hour crystallography class in its annual offerings. The class was originally designed for graduate students, but has since been crosslisted at the undergraduate level to permit adequately prepared undergraduate students to enroll. This has created the interesting challenge of defining appropriate learning outcomes for each level while maintaining the integrity of a single classroom.

The class is comprised of a comprehensive theory portion that covers symmetry, point, plane and space groups, diffraction, reciprocal space, structure factors, Fourier transforms, methods for data collection and structure solution, as well as a specialized lecture on the use of synchrotron and neutron sources. This is augmented by hands-on problem work or crystallography jeopardy games to improve student understanding of concepts taught.

The last third of the semester is focused on giving students hands-on experience in the application of crystallographic methods. In three projects, they learn to solve a single crystal structure, correct and index powder data, and carry out Rietveld refinements. This portion of the class is mandatory for graduate students, but optional for undergraduates. Changes in computing power and crystallographic programs have required modification of the projects at various times to ensure that students work with modern programs, but still are challenged to use their class knowledge in solving the given problems.

A number of years ago, the theory portions of this class were videotaped, and have been made available online through the educational resource website of the Advanced Photon Source. These videos are due for an update to improve video quality, incorporate advances in technology, and include the specialized lectures and instructions for the hands-on portions of the class, with the ultimate goal of providing a resource to students in all parts of the world that may not have access to a formal crystallography class at their home institution.

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