s14.m40.o4 **Teaching crystallography - an example of a course.** Ilona Turowska-Tyrk, *Department of Chemistry, Wroclaw University of Technology, Wybrzeze Wyspianskiego 27, 50-370 Wroclaw, Poland.*
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Keywords: Lecture; Classes; Laboratory

The crystallography course is obligatory for material engineering students at universities of technology in Poland. It is given after the first academic year. By that time the students will already have gained the basic knowledge in mathematics, physics and general chemistry. The crystallography course lasts one academic year i.e. two semesters. It consists of two stages: 1) lectures (30 hours) and classes (15 hours) in the first semester and 2) laboratory (45 hours) in the second semester. Additionally it is also possible to take part in research work. Usually fifty - sixty students attend the course. There are two class groups and five - six laboratory groups. Sometimes the lab groups are split into subgroups. The students have a final test after the classes and a final exam after the lecture. Those who pass the test and the exam can attend the laboratory. At the beginning of each lab they must pass a short theoretical test. The students obtain a database of examination questions and a list of textbooks. The lecture covers the following topics: 1) Object, aim and significance of crystallography; 2) Crystal systems; point groups; 3) Lattice, lattice planes, indices; Bravais lattices; 4) Space groups; 5) Relationships between a crystal lattice and morphology; 6) X-rays; neutrons; diffraction in crystals, theory; 7) The reciprocal lattice; Ewald construction; limiting sphere; 8) Reflection intensity; structure factor; atomic scattering factors; temperature factors; Friedel's law; 9) Crystal lattice symmetry vs. diffraction image symmetry; systematic absences; 10) Phase problem; direct methods; the Patterson function and heavy atom method; 11) New achievements in crystallography. The classes topics are as follows: 1) Symmetry elements and operators; cyclographic and stereographic projections; projections of faces and symmetry elements of crystal models; crystal systems; 2) Point groups: symbols and projections; centro-symmetry and noncentro-symmetry; 3) Bravais lattices; 4) Glide planes and screw axes; 5) Space groups: symbols and projections; International Tables for Crystallography, vol. A; 6) Real and reciprocal lattices. The laboratory topics are as follows: 1) Film methods: Laue, rotation, oscillation (experiment) and Weissenberg methods; 2) Indexing, systematic absences (Weissenberg photographs); 3) X-ray area-detector diffractometer: cell constants determination; intensity data collection; integration and data reduction; 4) Diffraction and space groups determination; 5) Crystal structure solution (SHELXS); 6) Crystal structure refinement (SHELXL); 7) Graphical representation of the structure; preparation of results in a form accepted by international crystallographic journals; 8) Oral presentation of papers from international crystallographic journals; 9) Cambridge Structural Database; 10) Diffraction of powder samples (at another department); 11) Thin molecular layers (at another department). Manuals are prepared for almost all topics. It is very important not only what you teach, but also how you do it. The knowledge on rules applied in general teaching helps teach crystallography. Teaching in not my only duty. I also work on monitoring photo-induced structural changes in crystals.

s14.m40.o5 **Teaching Crystallography on the Internet**. C.E. Naylor, D.S. Moss, C. Sansom, *Department of Crystallography, Birkbeck College, Malet Street, London, UK,WC1E 7HX. E-mail: c.naylor@mail.cryst.bbk.ac.uk*

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The School of Crystallography at Birkbeck College, London, UK has been running a part time accredited graduate courses entirely over the Internet since 1996. Our Advanced Certificate courses in Protein Crystallography, Principles of Protein Structure and Techniques in Structural Molecular Biology are of one year duration. Appropriate combinations of two of these courses constitute an MSc (Structural Biology). Students on the Protein Crystallography course learn to solve structures using CCP4 software and on the Principles of Protein Structure course use software programs such as Rasmol and Chime to visualize and manipulate molecular structures in three dimensions. They interact with their tutors, based at Birkbeck, using email and text-based teleconferencing, and can test their knowledge with multiple choice quizzes on the Web. Over three hundred students from 30 countries have registered for these courses in the last seven years.