

Summer School on Exploring Structures of Molecules and Materials at U Toledo

Starting in Summer 2010, the Chemistry Department at the University of Toledo (UT) will be hosting a Research Experience for Undergraduates (REU) Site. The site will focus on “Exploring Structures of Molecules and Materials”, teaching students to utilize a variety of structural characterization methods, including many crystallographic techniques.

Two UT chemistry professors, **Timothy Mueser** and **Cora Lind**, developed this proposal to the National Science Foundation for an REU site at UT to contribute to training goals outlined in a 2006 National Academy of Sciences report by the USNC/Cr. This document outlines crystallography-related topics that should be incorporated into K-12, undergraduate, and graduate curricula to stimulate interest in structure determination.

Formal crystallography education is on the decline, and has often been limited to graduate level classes in the past. This REU opportunity is designed to stand in the gap, and undergraduate research activities will emphasize hands-on experience with many of the techniques used to determine and analyze structures of molecules and solid-state materials.

The summer program will start with three days of introductory coursework covering the basics of scattering and diffraction methods, NMR, mass spectrometry, and electron microscopy. Hands-on training using state-of-the-art instruments available in the Arts & Sciences Instrumentation Center at UT will be an integral part of the coursework, allowing the undergraduate researchers to get an appreciation for the applicability of the techniques covered in the theory sessions. The remainder of the first week will be spent on a two day trip to Argonne National Laboratory, where students will have the opportunity to visit the Advanced Photon Source and participate in experiments on several beamlines. This will expose the students to cutting-edge research facilities, and will hopefully instill excitement about crystallography related research. A number of students will gain additional exposure to national facilities through participation in their group’s research projects during their internships.

Participating mentors include: **Amanda Bryant-Friedrich** (analysis of oxidative damage in DNA using NMR, mass spectrometry and crystallography); **Connie Schall**, in collaboration with **Paul Langan** at LANL (fiber diffraction studies of cellulose); **Cora Lind** in collaboration with **Zhongwu Wang** at CHESS (powder diffraction studies of negative thermal expansion materials under non-ambient conditions); **Don Ronning** (study of tuberculosis infection by protein crystallography); **John Belizzi** (crystallographic analysis of circadian proteins); **Leif Hanson** (neutron and x-ray scattering techniques to study protein complexes); **Max Funk** (crystallographic and scattering methods to study lipoxygenases); **Terry Bigioni** (colloidal nanoparticles); **Timothy Mueser**, in collaboration with **Kandace Williams** at the UT School of Medicine (neutron and x-ray scattering and diffraction methods to analyze DNA replication and repair complexes); and Wendell Griffith (analysis of protein conformation through a combination of x-ray diffraction and mass spectrometry).

Please communicate this opportunity to your undergraduates, and have them apply through the REU website at www.utoledo.edu/as/chemistry/REU.html. The fellowship includes a stipend, housing, and the visit to Argonne National Laboratory.



Top photo: U. Toledo Instruments; under that: Jennifer Heinerma, ORNL; next down, Stacy Gates, CHESS; just above, Connie Schall and Paul Langan at BioCat. Photos courtesy of Cora Lind.