

## Syllabus

### MSCI 435/MSCI 535/PHYS 535: CRYSTALLOGRAPHY AND DIFFRACTION Spring 2014

**Instructor:** Emilie Ringe, office: GRB E300A, email: emilie.ringe@rice.edu

**Teaching Assistants:** Graduate students: Lulu Ma and Rebeca Romero Aburto, Lulu.ma@rice.edu; rebeca.romero.aburto@rice.edu, Postdoc: Pei Dong, pd6@rice.edu

**Place & Time:** MEB128, MWF 10-11 am

**Textbooks:** Elements of X-ray Diffraction, 3<sup>rd</sup> ed. by Cullity & Stock; The Basics of Crystallography and Diffraction, 3<sup>rd</sup> ed. By Hammond. Both are available at the bookstore.

**Class Format:** The class time will consist of lectures mostly without powerpoint, in-class exercises, and student presentations. Outside of the class, the students will be expected to complete assignments, readings, and quizzes hosted on OWLspace.

**Grading:** Grading will be based on participation, both in class and online, frequent short quizzes of various kinds (including OWLspace tests, homework, etc) a project, and the more traditional midterm+final tests.

#### Topics Covered:

- Symmetry in 1D, 2D, and 3D
- Crystal lattices and nomenclature
- Reciprocal space
- Stereographic projections
- Properties of X-Rays
- Basics of X-Ray instrumentation
- Diffraction and scattering of X-Rays in crystals, intensities
- Temperature effects
- Intensities in polycrystalline samples
- Indexing powder and single crystal data
- Structure determination
- Size and strain effects
- Electron diffraction and crystallography
- Specialized techniques in X-ray diffraction
- Overview of complementary and related analytical techniques