## Syllabus: X-ray Diffraction

Quarter: Winter, 2001 Instructor: Prof. G. Beaucage Office 540 ERC, 556-3063, gbeaucag@UCEng.UC.edu Teaching Assistants: Sathish Sukumaran, 410B Rhodes, 556-5152 sukumash@email.uc.edu Textbook: "Elements of X-ray Diffraction", B. D. Cullity, 2'nd Edition (1978) (new edition if available) Other source: "X-ray Diffraction Methods in Polymer Science", L. E. Alexander (1969) "Methods of X-ray and Neutron Scattering in Polymer Science", R. J. Roe (2000)

Lab Thursdays 2:00pm to 5:00 Usually 1 hour. The class will be broken into groups of 3 to 4. Data will be shared on web where possible.

Synopsis of Course: Students will be introduced to the applications of x-ray diffraction in the characterization of materials.

**Basics** 

1. X-rays and the Diffraction Experiment. Chapter 1, Appendix 2.

2. Repetitive Structure in Materials. Chapter 2, Appendix 3.

3. Basics of Diffraction. Chapter 3.

4. Experimental Methods. Chapters 5, 7, 6.1-6.4, 6.9, 6.11, 6.12, 6.15, 6.16

5. Details of Diffraction. Chapter 4.

Applications (as many as possible)

6. Single Crystals, Fiber Patterns and Orientation Functions. Chapter 8-1 to 8-3.

7. Polycrystalline Aggregates and Semi-crystalline Morphology in Polymers. Chapter 9.

8. Crystal Structure. Chapters 10, 11-1.

9. Phase Diagrams. Chapters 12 and 13.

10. Chemical and Phase Composition. Chapters 14 and 15.

## **Course Requirements**

Quizzes: Each Thursday at End of Class.

Occasional Homework: Due 1 week from assignment.

Group work is encouraged for homeworks.

Labs: Don't copy old labs .

Labs are due Wednesday at 5pm (6 days after completing the lab). (A late lab is given a grade of 70 and will not be corrected.)

Work together on labs and share data but your write-up should be done independently.

## <u>Grading</u>

All asignments (quizzes, labs and occasional homeworks) will receive equal weight. The following letter grades will be based on the average of these assignments,

• A = 90.0-100

B = 80.0 - 89.9
C = 70.0 - 79.9

Only Whole Grades Are Used Unless the Class Petitions for Half Grades at the Start of the Quarter (first week).

An optional comprehensive final based on all quizzes, homeworks and labs can be used to replace up to 3 assignment grades. The average grade for the final will replace up to 3 prior grades. The optional final can only help your grade.