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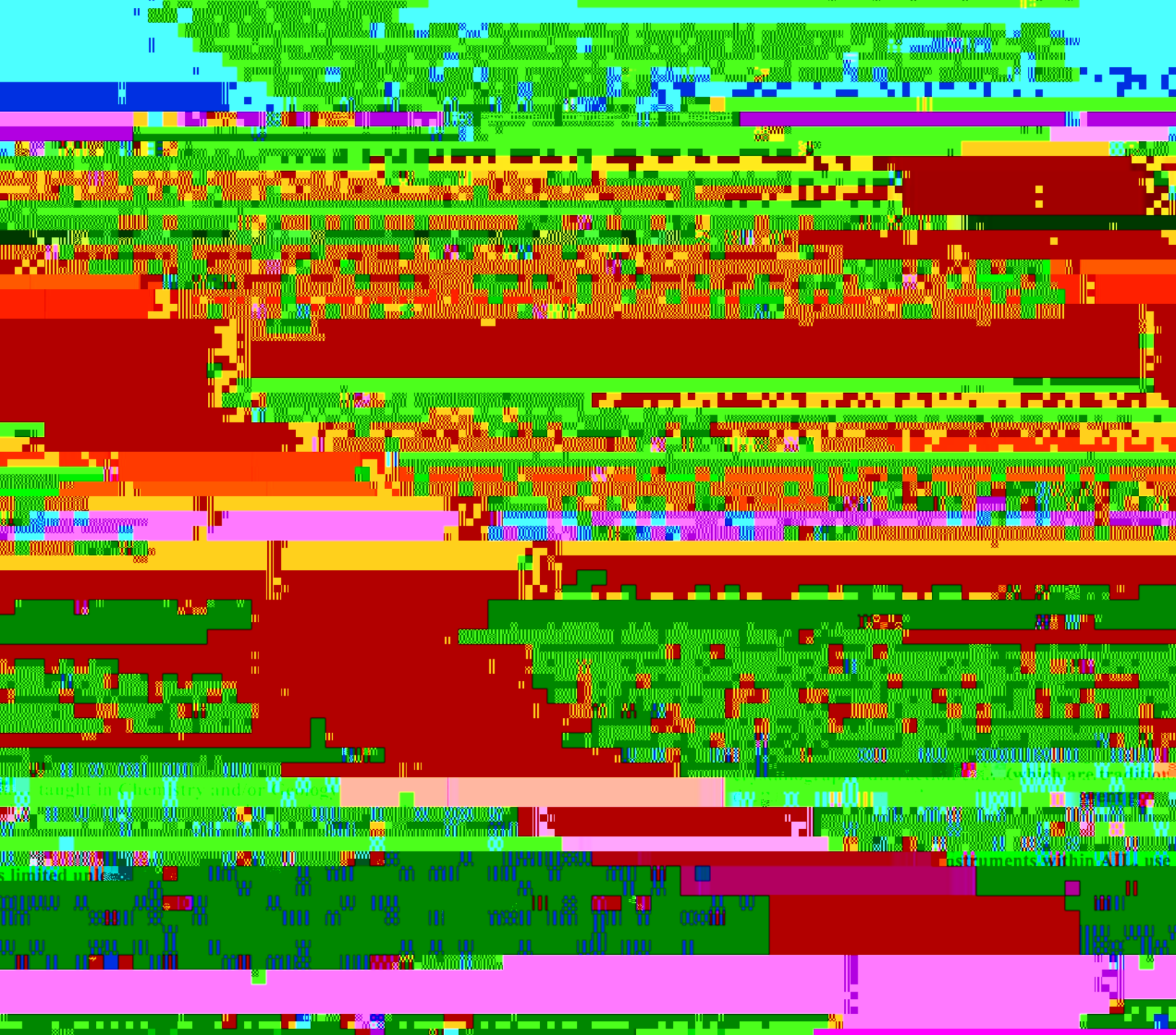
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APPROVALS:

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Crystallography and Diffraction

Course Id: CHEM 18 (3 cr.)
Prerequisites: Graduate Standing or permission of instructor

Lecture/Lab: TBA
Instructor: Tom Trainor

474-5628
tptrainor@alaska.edu

Office Hours: TBA
Grading:

Problem Sets/Labs	35%
Midterm exam	20%
Final Exam	20%
Final Project	<u>25%</u>
	100%

Course web page: TBA

Course description and goals:

The goal of this course is to understand the structure of crystalline materials, and how to use X-

ray diffraction techniques to study materials structure and structural properties. Material structure

Instructional Methods:

Lecture

Two lecture periods per week will be used to deliver the core materials. Focus will be on

the use of x-ray diffraction instrumentation and interpretation of data. Lecture topics will be complimented by problem sets and tested via written exam.

Laboratory

Students will be given hands on training in the use of XRD instrumentation and analysis software. Assignments will build upon lecture topics using practical examples. Students

Important Dates:

Sept XX – Deadline for late registration

Sept XX – Deadline for drop

Oct XX - Deadline for withdrawal

Computer Lab:

Your enrollment in Chem 618 gives you user privileges in the department's computer lab.

Information and policies are available at:

<http://www.uaf.edu/chem/NewNetwork.html>

Student with Documented Disabilities:

Student with a physical or learning disability who may need academic accommodations, should contact the Disability Services office (203 WHIT, 474-7043). Disability Services will then notify the instructor of special arrangements for course work

The Chemistry Department Policy on Cheating is: *“Any student caught cheating will be assigned a course grade of F. The student will not be allowed to drop the course.”*

The UAF Honor Code states: *“Student will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations. Student will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrase) in*

compositions, these and other reports. No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors. Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violation of the

Topics

I. Crystallography

- Crystal lattice and crystal structures
 - Definition of a unit cell, unit cell contents
 - Periodicity, lattice points and lattice vectors
 - Crystallographic planes, directions and indices
 - Reciprocal lattice
- Symmetry operations and symmetry elements
 - Finite symmetry elements (point groups)
 - Infinite symmetry elements (space groups)
- The International Tables, Volume A, Space Groups and Structure Maps, C. S.

II. Diffraction

- Properties and sources of radiation
- Geometrical treatment of diffraction by lattices
 - Bragg's equations and Bragg's Law

- Reciprocal lattice and Ewald sphere
- Powder vs single xtal XRD
- Derivation of the structure factor
 - Scattering by electrons, atoms and lattices
 - Fourier analysis
 - Diffraction from imperfect crystals and powders (kinematic diffraction)

course. Last fall the assignments in the diffraction instrument installed in 2009 in the Reberndt Building. I found that there... and therefore it would be appropriate to

course involved mostly hands-on use of the new the Advanced Instrumentation Laboratory for

consumables...