

PHYS318

X-Ray Diffraction (XRD)



Dr. Furqan Almyahi
Tuesday (12:30-2:30)

Assessment

- **1st Midterm exam (26/11/2019)** **15%**
- **2nd Midterm exam (7/1/2020)** **15%**
- **Quizzes (Five quizzes)** **10%**
- **Homework** **(Add 5%)**
- **Final exam** **60%**



Chapter 1: Basics of XRD

- Introduction
- Electromagnetic radiation
- Production of X-rays
- The continuous spectrum
- The characteristic spectrum
- Absorption
- Filters
- Safety precautions



Chapter two: X-ray crystallography



2.1 Introduction to crystallography

2.1.1 Basic definitions

2.1.2 Crystal system and Bravais lattices

2.1.3 Lattice directions and planes

2.2 X-ray diffraction and Bragg's law

2.3 X-ray spectroscopy

2.4 Diffraction directions

2.5 Diffraction methods

2.5.1 Laue method

2.5.2 Rotating-crystal method

2.5.3 Powder method

Chapter three: Diffraction peak intensities



3.1 Scattering by an electron

3.2 Scattering by an atom

3.3 Scattering by a unit cell

3.4 Structure-factor calculation

2.5 Factors affecting intensities of X-ray peaks

Chapter Four: Phase–diagram determination

4.1 Introduction

4.2 General principles

4.3 Solid solution

4.4 Determination of solvus curves



Chapter Five: Determination of crystal structure



5.1 Basic Principles of Crystal Structure Analysis

5.2 Indexing patterns of cubic crystals

5.3 Analytical Method for Non-Cubic Crystals

5.4 Determination of the number of atoms in a unit cell

5.5 Determination of Atomic Positions