Republic Of Iraq
Ministry Of Higher Education
& Scientific Research
University Of Basrah
College of Science
Department of Physics

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة البصرة
كلية العلوم
قسم الفيزياء

اسم المقرر: الاشعة السينية X-Rays

رمز المقرر: ف٣١٨
عدد الوحدات: ٢

لغة التدريس: اللغة الانكليزية

Course Syllabus:

1. Fundamental Properties of X-rays

1.1 Introduction
1.2 Nature of x-rays
1.3 Production of x-rays
1.4 The continuous spectrum
1.5 The characteristic spectrum
1.6 X-rays absorption
1.7 X-rays filters
1.8 X-ray optics
1.9 X-ray detectors
1.10 X-rays safety

2. Scattering and Diffraction

2.1 Introduction
2.2 Scattering by an electron
2.3 Scattering by an atom
2.4 Scattering by a unit cell
2.5 Structure-factor Calculations
2.6 Factors affecting the relative intensity of the diffraction lines on a powder pattern
2.7 Intensities of Powder Pattern Lines

3. X-Ray Diffraction

2.8 Crystal Structure Analysis
2.9 Identification by X-Ray Diffraction

2.10 Quantitative Phase Analysis
2.11 Crystallite size
2.12 Strain
2.13 Perfect Crystals
2.14 Stress and Texture

4. X-ray Radiography and Computed Tomography

4.1. Planar X-Ray Radiography
4.2. X-ray imaging detectors
4.3. Quantitative characteristics of planar X-ray images
4.4. X-ray contrast agents
4.5. X-ray imaging techniques
4.6. Clinical applications of planar X-ray imaging
4.7. Computed tomography CT
4.8. Instrumentation for CT
4.9. Image reconstruction in CT
4.10. Digital X-ray tomosynthesis
4.11. Radiation dose
4.12. Clinical applications of CT

5. Other X-ray techniques

1.1 Small-angle X-ray scattering
1.2 X-ray fluorescence (XRF)
1.3 Proton-induced X-ray emission (PIXE)
1.4 X-ray photoelectron spectroscopy

References

1) Elements of X-Ray Diffraction, B.D. Cullity S.R. Stock, Third Edition, 2014.
2) X-Ray Diffraction Crystallography, Yoshio Waseda, Eiichiro Matsubara, Kozo Shinoda, 2011.
3) Powder Diffraction Theory and Practice, Robert E. Dinnebier, Simon J. L. Billinge, 2008.
4) Introduction to Medical Imaging Physics, Engineering and Clinical Applications, Nadine Barrie Smith, 2011

الأستاذ الدكتور
هيثم لفتة سعدون
رئيس قسم الفيزياء