

Illinois Institute of Technology

PHYS 570 – Introduction to Synchrotron Radiation

Term: Fall 2021, August 23, 2021 – December 15, 2021

Time: Tuesday & Thursday 17:00-18:15

Location: Live & Internet

Instructor: Carlo U. Segre

Description: This is a graduate course which introduces students to the production, manipulation and use of synchrotron radiation in research. The course will include visits to, and possibly hands-on experience with, beamlines at the Advanced Photon Source (APS) at Argonne National Laboratory but is not specific to the APS. Students will be expected to give presentations and write a General User Proposal to the APS as their final projects. Graduate students in any science or engineering program are welcome to register as are undergraduates with senior standing and permission of instructor. It is particularly recommended for students wishing to make use of synchrotron radiation in their research. The class meets Tuesdays and Thursdays 17:00-18:15 and the lectures are available online as an Internet section for students not on the IIT campus or outside the United States.

Textbook: *Elements of Modern X-Ray Physics*, 2nd ed., Jen Als-Nielsen and Des McMorrow, (John Wiley & Sons, Ltd. 2011).

Topics Covered:

- X-rays and their interaction with matter
- Sources of x-rays
- Refraction and reflection from interfaces
- Kinematical Diffraction
- Diffraction by perfect crystals
- Photoelectric absorption
- Resonant scattering
- Small angle scattering
- Other topics as appropriate

Course Organization: The grade will be based equally on homework assignments, student presentations and a draft General User Proposal to the Advanced Photon Source. There will be at least one remote access session at the Sector 10-BM line. Depending on access, there may be one optional field trip to the Advanced Photon Source for experiment demonstrations and a tour.

For more information please contact Carlo Segre (segre@iit.edu)