

PhD course “*Aperiodic crystals and Quasicrystals*”

SYLLABUS

1 Lecturer information

Name and Surname: Prof. Luca Bindi

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Proposed by: Prof Carla Bazzicalupi (for courses taught by an external lecturer)

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2 Title of the course

Aperiodic crystals and Quasicrystals

3 Course program

(150-200 words)

Introduction to aperiodicity; incommensurately modulated structures; composite modulated structures; quasicrystals; how to study and describe an aperiodic material.

4 Course content detailed per lesson of two hours (possibly with dates and room real and virtual)

Lesson 1 – Introduction to aperiodic materials

Lesson 2 – Incommensurately modulated structures

Lesson 3 – Composite modulated structures and quasicrystals

Lesson 4 – how to study and describe an aperiodic material

5 Suggested reading

L. Bindi, G. Chapuis (2017) Aperiodic Mineral Structures. In “*Mineralogical Crystallography*” (Plasil J., Majzlan J. & Krivovichev S., Eds.), *EMU Notes in Mineralogy*, Vol. 19, Chapter 5, pp. 213-254. (ISBN 978-0903059-5).

L. Bindi, M. Nespolo, S. Krivovichev, G. Chapuis, C. Biagioni (2020) Producing highly complicated materials. Nature does it better. *Reports on Progress in Physics*, 83, 106501.

6 Learning Objectives

To understand what an aperiodic material is and how to deal with it.

7 Knowledge and Skills to be acquired

Good 3D-crystallographic skills.

8 Prerequisites

Nil

9 Teaching Methods

MODE 1 - Pre-recorded lessons uploaded on the moodle platform (a meeting must be organized with PhD students in order to clarify eventual doubts)

MODE 2 (preferred) - Lessons delivered in-person and in remote with simultaneous recording by the WEBEX platform

(The lessons must be recorded and available to all the students that cannot take part to the lessons in streaming. The Webex platform must be used. All course content should be uploaded to the Moodle platform on the Chemical Sciences PhD page “Courses and Seminars of the PhD in Chemical Sciences 2021-2022”)

10 Further information

11 Type of Assessment

Students will work in pairs. Please choose a partner for this assignment.

You and your partner should choose a paper from the scientific literature on the topics covered in the course to comment in depth.

Format: no more than three A4 pages, 12 pt type, 1.75 cm margins, 1.5 line spacing, Additional pages are permitted for Figures and References (scientific literature cited).

Submit the paper as a pdf file by email to: annamaria.papini@unifi.it, luca.bindi@unifi.it, and carla.bazzicalupi@unifi.it

12 Period

January – February 2023