

Ph.D. in “Life Course Research” – Biomedical curriculum

Academic Year 2023-2024

Course: **Molecular Genetics**

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**Objectives:**

The aim of the course is to introduce students to the basics of genetics. The approach will be descriptive, starting from the basic knowledge on genetics and DNA structure and then trying to explain the role that epigenetic molecular mechanisms have in the aging process and their interaction with environmental factors.

**Program:**

Lesson 1:

- Basic of genetics
  - DNA, chromatin, RNA
  - Transcription and translation
  - Chromosomes structure (genes and alleles)
  - Heritability of certain traits (mendelian, complex and polygenic traits)

Lesson 2:

- Population genetics
  - Hardy-Weinberg equilibrium, genetic drift, bottleneck and founder effects, migrations
  - Linkage disequilibrium and its effects
  - Polymorphism (SNP, VNTR, STR)
  - Next-Generation Sequencing (NGS) techniques
  - LOD score
  - Heterogeneous diseases

Lesson 3:

- Genetic of aging → Genes associated to aging and longevity (healthspan)
- Epigenetic of aging

**Suggested lecture:**

Articles related

**Requirement:**

Notion of genetics and molecular biology