



MOLECULAR MICROBIOLOGY

CU characterization:

CU name:

Molecular Microbiology

Scientific area acronym:

BM

Duration:

Quarterly

Working hours:

168

Contact hours:

66

ECTS:

6

Observations:

Mandatory CU

Teacher in charge and respective teaching load in the CU:

Isabel Couto – 15 hours

Other teachers and respective teaching load in the CU:

Miguel Viveiros – 1.5 hours

Ricardo Parreira – 9 hours

João Piedade – 9 hours

Liliana Rodrigues – 8 hours

Intended learning outcomes (knowledge, skills and competences to be developed by the students):

After this unit, students should be able to:

1. To understand and distinguish concepts of bacterial identification and typing.
2. To know the processes of transfer of genetic information in prokaryotes.
3. To know the main tools for the molecular detection of opportunistic fungal infections.



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Intended learning outcomes (knowledge, skills and competences to be developed by the students): (continuation)

4. To understand the different steps of the viral replication cycle and the molecular interactions established during the viral replication cycle by viruses of different families with animal cells.
5. To recognize the diversity of rapid diagnostic tests and their applications; particularly in the context of tropical diseases and decentralized diagnosis (“point-of-care”).
6. To understand the principles and execute some main molecular protocols used in the laboratorial diagnosis of infections caused by bacteria, fungi or viruses.
7. To understand the fundamentals of molecular diagnostic methods, advantages limitations and validation.

Syllabus:

Theoretical component

- I. The concept of bacterial species.
- II. Molecular methods of identification and typing. Hibridization and amplification of nucleic acids
- III. Transfer of genetic information in prokaryotes
- IV. Molecular tools for the detection of fungi in clinical samples
- V. Entry of viruses into cells. Replication strategies of viruses with DNA, and RNA genomes. Virion assembly and release from cells.
- V. Entry of viruses into cells. Replication strategies of viruses with DNA, and RNA genomes. Virion assembly and release from cells.
- VI. New technologies (biosensors, microarrays, paper microfluidics)
- VII. Applications of molecular tools to the microbiological diagnosis and its validation

Practical component

- I. Application of PCR and reverse hybridization for the detection of M tuberculosis DNA in sputa.
- II. Use of multiplex PCR and real-time PCR for the detection of T pallidum DNA in a sample of genital ulcer exudates of patients with suspected primary syphilis
- III. Application of different protocols for fungal DNA extraction and identification
- IV. Extraction and analysis of RNA of hepatitis C virus (HCV) from a plasma sample

Teaching methodologies (including assessment):

The total contact hours (40 hrs.) will be distributed by fourteen lectures (22 hrs.), and six classes of laboratory practice (15 hrs.).

Students with 2/3 of class attendance will be evaluated through a written exam of multiple choice questions, focusing on the content of theoretical and practical classes (100% total classification, rating scale: 0 to 20).

Students rated 9.5 or higher in this exam will be approved.



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References for consultation / mandatory existence:

- Patricia, M. Tille. (2013) Bailey & Scott's Diagnostic Microbiology. Elsevier, 13ª Ed.
- Madigan, M., Martinko, J., Bender, K., Buckley, D. & Stahl, D. (2015) Brock Biology of Microorganisms. Pearson Education Ltd, England, 14th Ed.
- Larry, S., Peters, J. E., Henkin, T. M. & Champness, W. (2013). Molecular Genetics of Bacteria. ASM Press, 4th Ed.
- Flint, S.J., Enquist, L.W., Racaniello, V.R., Skalka, A.M. (2009). Principles of Virology. ASM Press, Washington, DC, 3ª Ed. (2 vols.).
- Knipe, D.M. & Howley, P.M. (Ed). (2013) FIELDS Virology, 6th Ed. Lippincott Williams & Wilkins.
- Barroso, H., Meliço-Silvestre, A. & Taveira, N. (Eds). 2014. Microbiologia Médica. Lidel, Lisboa.