

Course Structure:

The course comprises nine theoretical chapters with general contents and the corresponding exams, six laboratory techniques and a research module with management of gene databases, scientific papers and practical exercises.

Students are also encouraged to design and undertake, if possible, a research project that could be undertaken in collaboration with a member of the university. This module is designed to increase their ability to critically analyse laboratory results and to use them to make decisions.

Course content

1-Lecture Material:

- **Basic Level:** Chapter 1, Bacterial structure; Chapter 2, Molecular genetics of bacteria; Chapter 3, Genetic basis of the resistance to antibiotics; Chapter 4, Bacterial pathogenesis; Chapter 5, Useful tools to control nosocomial infections.

- **Advanced Level:** Chapter 6, Epidemiology and control of infections caused by non-fermenting gram-negative rods; Chapter 7, Epidemiology and control of emerging *Acinetobacter baumannii* infections; Chapter 8, Transmissible genetic elements: plasmids, transposons and integrons; Chapter 9, Molecular techniques for detection of pathogens and virulence genes.

2- Molecular techniques:

Basic procedures: includes general information with practical and useful tips for laboratory work.

Methods in Molecular Microbiology: Laboratory protocols (figures, photos and videos from the laboratory) 1, Extraction of DNA from bacteria; 2, Analysis of DNA by agarose gel electrophoresis; 3, Polymerase Chain Reaction technique for amplification of virulence genes; 4 Typing of bacterial pathogens using Pulsed Field Gel Electrophoresis (PFGE) and 5, Detection of virulence genes by hybridization with DNA probes.

3- Assignments: Research and Methodological Projects

This part of the course is assessed through a variety of methods, including research papers, useful references and links to web sites of interest. Databases and web tools are very useful to acquire skills in analysing sequences, restriction enzyme mapping, comparison of genes and design of primers and probes.

4- Readings and references