MASTER DEGREE IN MICROBIOLOGY

MICROBIAL TAXONOMY – Faculty of Sciences

Objectives:
The main goal of this course is to provide a sound theoretical background on principles and general methods of microbial taxonomy (particularly for prokaryotes), focusing the areas of classification, identification, differentiation and nomenclature. A practical approach of the main differentiation/classification methods currently used in bacterial taxonomy is also undertaken. As additional goals, the applicability of concepts and methods in terms of microbial taxonomy sensu latu, as well as working environment, is discussed.

Program:
Theoretical Course
Introduction to Taxonomy. Basic concepts. Approaches and evolution of bacterial taxonomy. Species concept in microbiology. Interactions and utility of taxonomy. Numerical taxonomy. Basic prnciples. Hierarchical and non-hierarchical methods in taxonomy. Chemotaxonomy. Basic principles and methodologies. Analytical fingerprinting methods. Molecular taxonomy. Basic principles. Phylogenies. Phylogenetic markers and whole-genome phylogenies. Phenotypic diversity and phylogeny. Nomenclature: basic principles and rules. Identification and diagnosis: phenotypic and molecular approaches. Differentiaition and typing: phenotypic and molecular methods. Epidemiology and traceability. Polyphasic approach.

Practical Course
Data analysis in numerical taxonomy: NTSYS-PC (Exeter) and BioNumerics (Applied Maths) softwares. Application of chemotaxonomic and molecular methods in the identification and typing of selected microorganisms.

Evaluation methodology
Lectures integrated with presentation and discussion of recently published results. Laboratory practicals including experimental work, analysis and discussion of results. Early release of study materials (thematic and analytical programs, slides of lectures in pdf, pdf of available papers, etc.). The student can choose one of two models of assessment: (i) global written exam to be held at the time of examinations (two dates for the exam in accordance with FCUL rules); or (ii) two partial frequencies (written tests) to be held on the dates indicated at the beginning of the semester. Each frequency corresponds to 50% of the final mark with the classification value directly rounded to units (0 to 20). Students who select the frequencies can only be presented to the 2nd date of examination for the purpose of appeal or classification improvement. Approval for mark a 9.5 (0-20).

Recommended bibliography:
- Bergey's Manual of Systematic Bacteriology (2001-2011). 2nd ed. Volumes 1-4.
- Goodfellow, M. & O'Donnell, A. G. 1993. Handbook of New Bacterial Systematics. Academic Press. London.
- Goodfellow, M. & O'Donnell, A. G. 1994. Chemical Methods in Prokaryotic Systematics. John Wiley & Sons. New York.
- Priest, F. & Austin, B. 1993. Modern Bacterial Taxonomy. 2nd ed. Chapman& Hall. London.
- Sneath, P.H.A. & Sokal, R. R. 1973. Numerical Taxonomy: The Principles and Practice of Numerical Classification. W. H. Freeman and Company. San Francisco.