

## Degree in Biomedical Laboratory Techniques

### Teaching: Clinical practice 2

SSD: MEDS-26/A

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CFU: 25

### PREREQUISITES

Passed the exam clinical practice 1.

### LEARNING OBJECTIVES

These are indispensable objectives, knowledge of the equipment and methodologies used in laboratory medicine investigations. Another important objective is the knowledge and proper management of the analytical phase for processing biological specimens, in order to achieve the educational objectives of the professional profile. These objectives will be achieved through practical activities in the laboratories of clinical microbiology, transfusion medicine, pathological anatomy, molecular biology and clinical biochemistry. The practical part will involve interaction with professional mentors in order to facilitate learning and improve the ability to address and solve the main diagnostic questions of laboratory medicine.

### LEARNING OUTCOMES

#### Knowledge and understanding

Knowledge and comprehension skills

By the end of this course, the student should be able to:

- Knowledge and interpretation of analytical controls in daily sessions
- Knowledge of calibrators and interpretation of calibration curves
- Knowledge and interpretation of control charts
- Knowledge of applied laboratory analytical methodologies
- Knowledge and correct management of the analytical phase in laboratories of clinical microbiology and virology, transfusion medicine, pathological anatomy, clinical biochemistry and molecular biology
- Knowledge of computer systems in the laboratory
- Knowledge and management of TAT (turn around time)
- Be able to correctly manage the pre-analytical and analytical phase
- Be able to correctly report and manage laboratory criticalities

#### Applying knowledge understanding

Upon completion of the course, the student will be able to:

Use the acquired laboratory knowledge for the in-depth study of aspects related to the field of laboratory diagnostics, to which the student will devote himself/herself in professional activity.

#### Communications skills

At the end of the course the student must know:

Use scientific terminology, specific in the field of laboratory medicine, in a manner consistent with various laboratory contexts.

### **Making judgements**

At the end of the course the student must know:

carry out rough assessments relating to the topics covered in laboratory medicine.

### **Learning skills**

The student will have acquired learning skills and methods appropriate for the deepening and improvement of his or her skills in the area of knowledge of the analytical phase of laboratory medicine, including through consultation of scientific literature.

## **COURSE SYLLABUS**

### **CLINICAL BIOCHEMISTRY**

- Knowledge of the analytes and methodologies used for their research.
- Knowledge of computer systems present in the laboratory
- TAT (turnaround time)
- Knowledge and interpretation of analytical checks in daily sessions
- Knowledge of calibrators and interpretation of calibration curves
- Knowledge and interpretation of control charts
- Knowledge and execution of blood counts with leukocyte formula and co-coagulation parameters
- Chemical and physical examination of urine
- Knowledge and correct management of the analytical and post-analytical phase, with attention to the validation of the analytical data

### **MICROBIOLOGY AND VIROLOGY**

- Knowledge of the analytes and methodologies used for their research.
- Knowledge of computer systems present in the laboratory
- TAT (turnaround time)
- Knowledge and interpretation of daily session controls (immunoserology)
- Knowledge of culture media and correct conservation of the same
- Knowledge and application of bacterial seeding methods
- Knowledge of the main colors used (Gram, Ziehl Neelsen, methylene blue and Giemsa)
- Knowledge of the research and identification systems of bacteria present in various biological fluids (bronchial aspirate, feces, urine, blood culture, sputum, pericardial fluid, peritoneal fluid and various biological liquids)
- Knowledge and processing of various biological samples (nails, wound pads, bone fragments, biopsies etc.)
- Knowledge of the techniques for the processing of cerebrospinal fluid in an emergency regime
- Knowledge about the performance of the antibiogram
- Knowledge of techniques for the detection of aerobic, anaerobic and microaerophilic bacteria
- Knowledge and application of serological methodologies for direct and indirect inquiries for the identification of bacteria and viruses
- Knowledge and correct management of the analytical and post-analytical phase, with attention to the validation of the analytical data

### **PATHOLOGICAL ANATOMY**

- Knowledge on the correct acceptance of biological samples
- Knowledge on the correct conservation of tissues
- Knowledge on the processing of fabrics for inclusion in paraffin
- Knowledge on the preparation of histological preparations: inclusion, cutting, hematoxylin eosin staining
- Knowledge for the preparation of urinary samples
- Knowledge for the preparation of cervico-vaginal samples
- Knowledge of the main colors
- Samples staining according to Pap and May-Grunwald-Giemsa methods
- Knowledge and correct management of the analytical and post-analytical phase, with attention to the validation of the analytical data

### **TRANSFUSION MEDICINE**

- Knowledge for the determination of the ABO system and Rh factor
- Knowledge and testing of blood groups. The direct and indirect Coombs technique in erythrocyte immunohematology.
- Knowledge and correct management of the analytical and post-analytical phase, with attention to the validation of the analytical data

### **MOLECULAR BIOLOGY**

Extraction of nucleic acids DNA and RNA

- Proper conservation of extracted nucleic acids
- PCR Realtime
- Interpretation of realtime PCR curves
- Quality controls
- Knowledge of molecular investigations, for the identification of bacteria and viruses
- Knowledge and correct management of the analytical and post-analytical phase, with attention to the validation of the analytical data

### **COURSE STRUCTURE**

The course is structured in 625 hours of practical laboratory activities and exercises, divided into daily 7-hour laboratory activities and scheduled according to the academic calendar. Each student is supported by a dedicated professional tutor. Students will rotate in the laboratories of microbiology and virology, transfusion medicine, pathological anatomy, clinical biochemistry and molecular biology, the time to be devoted to which is related to the training programmes and training objectives

### **COURSE GRADE DETERMINATION**

The verification of the students' preparation will take place by means of a practical examination structured as follows: there will be an evaluation form for each student in the various training areas, which will contribute to a final evaluation with a minimum score of 12 and a maximum of 20 points. The remaining 10 points will be awarded by the examination board through the practical test in the respective areas, for which there is a maximum score of 10 points per test. The exam will be passed

with a minimum mark of 18/30 and a maximum of 30/30, with possible honours awarded by the board with a unanimous decision. The final mark is derived from the sum of the mark on the evaluation sheet and the average of the five practical tests in the various areas. To qualify for the examination, the student must have scored a minimum of 12 points on the evaluation sheet. During the test, the Board of Examiners will assess the student's ability to apply knowledge and will ensure that the skills are adequate to support and solve laboratory medicine-related problems.

The following parameters will be assessed: applied knowledge and understanding, autonomy of judgement, communication skills and the ability to learn. Particular assessment focus will be on the student's ability to solve problems (case reports), assessment of manual skills, and knowledge and application of the correct technical-scientific language of laboratory methodologies.

Specifically, the examination will be assessed according to the following criteria:

**Not suitable:** Poor or lacking knowledge and understanding of the topics; limited capacity for analysis and synthesis, frequent generalizations of the requested contents; inability to use technical language.

**18-20:** Just enough knowledge and understanding of the topics, with obvious imperfections; just sufficient capacity for analysis, synthesis and autonomy of judgment; poor ability to use technical language.

**21-23:** Sufficient knowledge and understanding of the topics; sufficient ability to analyze and synthesize with the ability to reason with logic and coherence the required contents; sufficient ability to use technical language.

**24-26:** Fair knowledge and understanding of the topics; discrete ability to analyze and synthesize with the ability to rigorously argue the required contents; good ability to use technical language.

**27-29:** Good knowledge and understanding of the required contents; good ability to analyze and synthesize with the ability to rigorously argue the required contents; good ability to use technical language.

**30-30L:** Excellent level of knowledge and understanding of the required content with an excellent ability to analyze and synthesize with the ability to argue the required content in a rigorous, innovative and original way; excellent ability to use technical language

The final evaluation will be formulated from the sum of the score on the evaluation sheet and the average of the tests for the five areas.

### **SUPPORT ACTIVITIES**

Continuous discussion with tutors is recommended

### **RECOMMENDED TEXTS AND BIBLIOGRAPHY**

The student will be provided with teaching materials such as handouts, videos and presentations