Course Title	**Medical Microbiology**				
Course Code	ABS305				
Course Type	Compulsory				
Level	BSc (Level 1)				
Year / Semester	3rd / 5th Semester				
Teacher's Name	Prof Maritsa Gourni, Charis Charilaou				
ECTS	6	Lectures / week	3	Laboratories / week	2
Course Objectives	The main aim of the course is to help students gain the theoretical knowledge and skills needed in Medical Microbiology and to familiarize with the latest advancements in diagnosis and treatment related to Medical Microbiology. The course will cover topics on the investigation and diagnosis of the most common human infections and provide students with an introduction to the epidemiology of infectious diseases and molecular aspects of medical microbiology (bacteriology, virology, mycology and parasitology).				
Learning Outcomes	Upon successful completion of this course the students will be able to: • Identify and describe microorganisms of clinical importance (bacteria, viruses, fungi, parasites) that cause disease to humans. • Explain the mechanisms of pathogenesis and development of infectious disease and describe their main clinical manifestations and epidemiological characteristics. • Recognize the main antimicrobials, understand their mode of action and the mechanisms of resistance. Be able to explain the impact of resistance in public health and the importance of monitoring antimicrobial resistance. • Describe the main laboratory procedures used in Medical Microbiology settings for identifying and diagnosing human infections.				
Prerequisites	ABS201	Required	None		
Course Content	<u>Theory</u> • Introduction to Medical Microbiology, the basic concepts and the related terminology. Historical overview of the most common human diseases caused by microorganisms. • The concept and importance of normal flora. Infection, pathogenicity and disease. Host-parasite relationships.				

- Overview of the most medically important microorganisms: cell structure, morphology, life cycle, phenotypic/ phylogenetic classification, function.
- Mechanisms of transmission, virulence and pathogenicity.
- The development and spread of antimicrobial drug resistance and the related mechanisms.
- The most significant discoveries and inventions in microbiological diagnostics. Common microbiological analyses in a laboratory setting (sample management, cultivation, conventional and automated identification, susceptibility testing).
- The methodologies used for microbial characterization, identification/ typing and drug screening. Good Laboratory Practices and Health & Safety regulations that apply to a microbiological laboratory.
- Epidemiology, the basic principles and related terminology. Modes and routes of transmission, morbidity and mortality, prevalence and incidence. Disease definitions.
- Current microbiological Public Health issues and epidemiological priorities. Community-acquired and nosocomial infectious diseases. Definition, types, causes, case management and prevention strategies.
- Emerging and re-emerging infectious diseases. Current challenges and future perspectives. The concept of a One Health approach.

Laboratory exercises:

1. Group exercises covering the standard microbiological methodologies/ techniques used in a laboratory setting, emphasis on applying good laboratory practices (GLP).

2. Hands-on practical experience by performing common procedures, including microbial cultivation, determination of susceptibility, pathogen purification, identification and diagnosis.

- Laboratory diagnosis of microbial pathogens following Health & Safety regulations and GLP: Collection of specimens, microscopic methods (simple stains, Gram stain, other differential stains, fluorescent stains). Overview of the standard serological, biochemical and molecular diagnostic techniques (Enzyme-linked immunofluorescence assays (ELISA), direct agglutination test (DAT), immunofluorescent antibody test (IFAT), Western blotting, PCR-based techniques (RT-PCR, real-time PCR, PCR-RFLP, DNA fingerprinting, microsatellite analysis, Sanger sequencing, next generation sequencing).

	• Laboratory diagnosis of bacterial diseases: Collection and handling of specimens, preparation and decontamination, bacterial culturing, microscopic examination, identification of bacterial types from various body fluids and tissues. • Laboratory diagnosis of viral diseases: Viral isolation and cell line (viral) culturing, microscopic examination, detection of viral proteins and genetic material, viral serology. Molecular detection and classification of viruses. • Laboratory diagnosis of parasitic diseases: Collection of specimens, parasite isolation and cell culturing, the use of inverted microscope, serological diagnosis (IFAT, ELISA), molecular diagnosis, parasite species identification and subtyping.
Teaching Methodology	Teaching methodologies will include: 1. Lectures using PowerPoint and image-rich material and short animations, to help students gain a comprehensive theoretical background in the field of Medical Microbiology, understand the principles, key concepts and the application of Medical Microbiology in clinical practice, laboratory settings and research investigation. 2. Practical sessions (group exercises, demonstration, wet labs) to provide a deeper comprehension of the main concepts of Medical Microbiology as well as hands-on experience on the methodology, procedures and the particular techniques used in medical microbiology settings. Emphasis will be given on the diagnosis of viruses, bacteria and parasites causing human disease. The practical exercises will be conducted under instructor's supervision and by using appropriate infrastructure and materials. Each practical will initiate with a thorough demonstration of the experimental procedures by the laboratory supervisor and will finalize with the write-up and submission of a laboratory report by the students or student groups. 3. Regular open-discussion and Q&A sessions to encourage students' participation, face-to-face interaction, brainstorm and develop analytical and critical thinking.
Bibliography	Textbooks: • Barer M., Irving W., Swann A.,Perera N.(2018) Medical Microbiology: A Guide to Microbial Infections: Pathogenesis, Immunity, Laboratory Investigation and Control, 19th edition, Elsevier. • Greenwood R., Slack J., Peutherer M., Barer D. (2016) "Ιατρική Μικροβιολογία". Ελληνική έκδοση, 18th edition, Ιατρικές Εκδόσεις Πασχαλίδης. • P.R. Murray, K.S. Rosenthal, M.A. Pfaller, ''Ιατρική Μικροβιολογία", (2011), Εκδόσεις Παρισιάνος. Additional resources: Supplementary readings including journal articles will be assigned on a per lecture basis.

Assessment	1. In-Class Activities and Mid-term Exam (20%): The students are required to actively participate at in-class activities, exercises and discussions. Relevant course material will be provided in-class as readings assignment, aiming to help students prepare for the session, foster effective in-class discussions and promote their participation. Additional homework readings and exercises will be assigned on a per lecture basis to provide opportunities for students to practice concepts covered in class and complete problems similar to the final exam questions. The students are expected to complete the assigned tests and submit them on time for evaluation and grading. Students are also required to take a written midterm exam (lecture test). This will include short answer questions, quizzes of multiple choices, fill in the blank and other question formats, as appropriate. The content will be based on the lecture material and required readings, and will resemble that of interim tests and the exercises practiced in-class or assigned as homework. 2. Laboratory reports (20%): Students are anticipated to submit after every practical a laboratory report describing the experimental methodology and particular procedures, the analysis of the data generated and the interpretation/ evaluation of their results (60% of the overall laboratory grade). Students are also expected to take a final laboratory examination (40% of the laboratory grade), which will mainly include quizzes of multiple choices and short problem-solving questions. 3. Final Exam (60%): Students are required to complete the Final Exam, which may include short answer questions, quizzes of multiple choices, fill in the blank and other question formats, as appropriate. The content will be based on the lecture material and required readings, and will resemble that of interim tests and the exercises practiced in-class or assigned as homework.
Language	Greek, English