II year (1st and 2nd semester) A.Y. 2025-2026	**Scientific Field**	**MICROBIOLOGY**	TUTOR	ECTS
	MED/07	Microbiology	Ceccherini Silberstein Francesca	2
	MED/07	Microbiology	Pica Francesca	5
COORDINATOR	MED/07	Microbiology	Svicher Valentina	1
	MED/07	Microbiology	Di Cave David	1
PICA FRANCESCA	MED/07	Microbiology	Santoro Maria	1

SPECIFIC AIMS	1. Producing knowledge and understanding of the structural, antigenic, metabolic and reproductive characteristics of different microbes (bacteria, viruses, fungi and parasites), their environmental distribution and their relationships with human hosts. 2. Considering the fundamental aspects of the direct (microscopy,cultivation, identification of microbes, molecular techniques) and indirect (serological methods) microbiological diagnosis. 3. Recognize how microorganisms solve the fundamental problems of their persistence into the environment. 4. Recognize how the underlying principles of epidemiology of disease, pathogenicity of specific microbes and host immune response affect human health. 5. Demonstrate aseptic technique and perform routine culture handling tasks safely and effectively. 6. Apply the scientific method to collect, interpret, and present scientific data in microbiology and related fields. 7. Illustrate the basic principles of antimicrobial's therapy and antibiotic-resistance mechanisms.

TOPICS General Bacteriology	Criteria for bacterial taxonomy and classification. The architecture of the bacterial cell : the bacterial chromosome, the cytoplasm, the cytoplasmic membrane. Gram staining. Gram positive and gram negative bacteria. Capsule. Flagella. Pili and fimbriae. Metabolism and bacterial growth: the production of bacterial spores. Bacterial genetics: chromosome and plasmids. The transfer of genetic material : transformation, transduction and bacterial conjugation. The pathogenic activity of bacteria and the stages of the infectious process. The bacterial adhesiveness, the ability to invade hosts, the production of toxins. Structure and mechanisms of action of exotoxins and endotoxins. The role of innate and cell-mediated immunity in bacterial infections. Immune sera and vaccines. General principles for the diagnosis of bacterial diseases. Antibacterial drugs and their mechanism of action. Mechanisms of bacterial resistance to antibacterial drugs.
TOPICS General Mycology	Fungi : structure, metabolism, replication and dimorphism. Mechanisms of fungal pathogenicity. Fungi and diseases.
TOPICS General Virology	Nature, origin and morphology of viruses, viral nucleic acids, proteins and lipids viral multiplication of animal viruses, virus-cell interaction. State of persistence and latency of the genome in the cell, host cell cultures, multiplication cycle, virus isolation animals, adaptation and virulence, inactivation of viruses, physical and chemical agents, cell surface antigens encoded by the virus, the immune response to viral infection. Interferons. Vaccines and antiviral chemotherapy.
TOPICS Special Bacteriology	Staphylococci . Streptococci. Pneumococci and Enterococci. Bacilli and Clostridia. Corynebacterium and Listeria. Enterobacteriaceae. Pseudomonas. Vibrio, Campylobacter and Helicobacter. Emophili, Bordetella and Brucella. Yersinie and Pasteurelle. Neisseria. Anaerobic microorganisms. Legionella. Mycobacteria. Spirochetes. Mycoplasma. Rickettsiae. Chlamydiae. Gardnerella.

TOPICS Special Mycology	Fungal infections by opportunistic fungi. Superficial, cutaneous, subcutaneous and systemic mycoses. Laboratory diagnosis of fungal diseases.
TOPICS Special Virology	Adenovirus, Herpesvirus, Poxivirus, Papovavirus, Parvovirus, Picornavirus, Orthomyxovirus, Paramyxovirus, Rhabdovirus. Togavirus and other viruses transmitted by insects. Filovirus. Rubella virus. Reovirus and Rotavirus. Hepatitis A virus. Retroviruses. Human Retroviruses. RNA and DNA tumor viruses. Prions.
TOPICS General and Special Parasitology	Systematics and Zoological Nomenclature, biological associations; general information on the life cycles of parasites, parasitic specificity , host – parasite interactions and pathogenic action of parasites, parasitic diseases of medical importance ; fight against parasitic diseases. Human parasites.

TEXTBOOKS	Patrick Murray r. et al. Medical Microbiology , Elsevier / Masson Editors Sixth Edition.
TEACHING METHOD	Lectures during which proactive engagement of students will be encouraged. Classroom attendance for at least 67,5% of the scheduled lectures

EXAM METHOD	Oral exam, evaluated out of thirty, ascertaining the overall preparation of the students, the ability to integrate the knowledge of the different parts of the program, the consequentiality of the reasoning, the analytical capacity and the autonomy of judgment. In addition, the language accuracy and clarity presentations are evaluated. The final grade will be related for 70% to the level of knowledge and 30% to the expressive ability and autonomous judgment demonstrated by the student. The exam will be assessed according to the following criteria: Not suitable: important deficiencies and / or inaccuracies in the knowledge and understanding of the topics; limited capacity for analysis and synthesis, frequent generalizations. 18-20: knowledge and understanding of the topics just sufficient with possible imperfections; sufficient capacity for synthesis analysis and autonomy of judgment. 21-23: Routine knowledge and understanding of topics; Ability to correct analysis and synthesis with coherent logical argumentation. 24-26: Fair knowledge and understanding of the topics; good analysis and synthesis skills with

EXAM COMMISSION	

Pica Francesca, President
Ceccherini Silberstein Francesca
Svicher Valentina
Di Cave David
Santoro Maria

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PREREQUISITES: Although there are no preparatory prerequisites, it is necessary for the student to know the basic concepts of biology, genetics, histology and anatomy.

The specific learning outcomes of the program are coherent with the general provisions of the Bologna Process and the specific provisions of EC Directive 2005/36/EC. They lie within the European Qualifications Framework (Dublin Descriptors) as follows:

1. **Knowledge and Understanding**

   - Assess the ubiquity and diversity of microorganisms in the human body and the environment.
   - Describe the morphology and physiology of microorganisms (bacteria, viruses, fungi, parasites) and the diseases they cause.
   - Understand the mutual relationship between microbes and human host in health and disease (definition and role of human microbiota).
   - Explore the multiple mechanisms by which microorganisms can cause disease (microbial pathogenicity and virulence).
   - Describe how human host counteracts infections by means of specific and nonspecific mechanisms (anatomical barriers, physiology of body systems, immune response, inflammation).
   - Achieve the ability to integrate knowledge about microbial structure, antigenicity and pathogenicity from the molecular to the clinical level..
   - Understand the consequences of alterations at the cellular and organ level in relation to transmission of infectious agents.

- Learn to interpret appropriate laboratory and diagnostic studies for each human pathogen.
- Identify the best practice to prevent and/or counteract the transmission of infectious agents (sterilization, disinfection, asepsis)
- Understand the principles and functioning of antimicrobials, vaccines and serum-prophylaxis actually in use.

2. **Applying Knowledge and Understanding**

- Apply the general microbiological knowledge to the clinical setting, being able to understand the basic principles of infectious diseases.
- Approach to the main diagnostic tests to assess infectivity and/or disease in hospital, communities and populations.
- Provide a differential diagnosis of microbial diseases based on the identification of specific signs and symptoms and the interpretation of laboratory data, providing a comprehensive explanation of the underlying reasoning.
- Describe the practical aspects of the diagnostic instruments in microbiology: when to use them and how to perform them in research laboratories and clinical settings.

3. **Making Judgements**

- Recognize the importance of an in-depth knowledge of general and medical microbiology consistent with a proper medical education.
- Identify the fundamental role of a proper theoretical knowledge of microbes and antimicrobials in the clinical practice
- Recognize the relevance of the microbiological research in social politics of promotion of public health and environmental defense.
- Be able to critically argue the findings obtained in the microbiological field in relation to data

available in the actual international literature.

4. **Communication Skills**

- Present the topics orally in an organized and consistent manner.
- Use of proper scientific language coherent with the topic of discussion.
- Be capable to have a discussion in class with other students on the microbiological topics addressed in previous lessons and/or topics of public interest on microbiological issues, possibly utilizing different supports such as ppt presentation and consultation of scientific and institutional databases (PubMed, Scopus, WHO, Italian Ministry of Health, etc.)

5. **Learning Skills**

- Identify the possible use of the acknowledged skills in the future career.
- Assess the importance of the acquired knowledge in the overall medical education process
- Be able to collect, interpret, discuss and communicate scientific data in the specific field, which can be useful in determining independent judgments including reflection on their impact on social and ethical issues (e.g. vaccination strategies, costs of new drugs development, drug-related public expenditures).