

Course Title	<b>Epidemiology of Infectious Diseases</b>				
Course Code	ABS208				
Course Type	Compulsory				
Level	BSc (Level 1)				
Year / Semester	2 <sup>nd</sup> / 4 <sup>th</sup> Semester				
Teacher's Name	Dr Sophia Kyradji, Dr Stavroula Gouzelou				
ECTS	6	Lectures / week	3	Laboratories / week	2
Course Objectives	<p>The main objective of the course is to provide the students with a strong theoretical background on the epidemiology of infectious diseases and the skills need in applied epidemiology for the investigation, surveillance, control and prevention of infectious diseases. In particular, the course aims to help students:</p> <ul style="list-style-type: none"> <li>• Comprehend the basic principles and concepts in epidemiology, the etiology and evolution of human infectious diseases, the key epidemiological measurements and health indicators.</li> <li>• Familiarize with the different study types and methodologies used in epidemiological research and the investigation of infectious diseases.</li> <li>• Recognize the main epidemiological features of medically important human infectious diseases (viral, bacterial, fungal and parasitic), the current global challenges in infectious disease epidemiology and appreciate the applications of epidemiology in the investigation, control and prevention of infectious diseases.</li> </ul>				
Learning Outcomes	<p>Upon successful completion of the course the students will be able to:</p> <ul style="list-style-type: none"> <li>• Describe the basic principles and concepts in infectious disease epidemiology, and define the main epidemiological characteristics of major human infectious diseases. Discuss in a professional manner historical epidemic/pandemic events as well as current epidemiological challenges and PH threats, explaining their aetiology (microbial resistance, climate crisis, emerging infectious diseases). Explain the role of vaccines in infectious disease control and prevention, appreciate the importance of vaccination.</li> <li>• List the types of epidemiological studies and recognize in which cases they are applied. Describe the advantages/ limitations of the different epidemiological methods, select the most appropriate method and explain the steps in the epidemiological investigation of a human infectious disease.</li> <li>• Designate the agencies responsible for monitoring infectious diseases nationally and internationally and explain their role. Describe the basic systems and tools used for notification, surveillance, data analysis/ biostatistics, predictive modelling and risk assessment of human infectious</li> </ul>				

	<p>diseases.</p> <ul style="list-style-type: none"> <li>• Design and carry out a simple epidemiological study for a human infectious disease by using appropriate research methodology and suitable data analysis/ statistical tools. Interpret and evaluate the results of their study, suggest measures for control and prevention.</li> <li>• Critically approach and evaluate published scientific reviews/ research articles on infectious disease epidemiology. Demonstrate the ability to write scientific essays/ reports relevant to the epidemiology of a human infectious disease, by using relevant literature and scientific data sources.</li> </ul>		
Prerequisites	None	Required	None
Course Content	<p><u>Theory:</u></p> <ul style="list-style-type: none"> <li>• Introduction to the epidemiology of infectious diseases: Basic principles, key concepts and definitions, the aetiology and types of infectious diseases, brief overview of major epidemics throughout history.</li> <li>• Epidemiological data sources and types of epidemiological studies: Descriptive epidemiology, health indicators, measures of infectious disease frequency (incidence, prevalence, morbidity, mortality). Analytical epidemiology (deductive, inductive), formulation and assessment of causal hypothesis, risk factors, transmissibility and dynamics of infectious agents.</li> <li>• Basic methods of epidemiological research, advantages and limitations, study design: investigation of infectious disease burden (e.g. population-based, cross-sectional, ecological studies), investigation of disease determinants, associations and causation (e.g. cohort studies, case-control studies, cross-sectional studies). Basic statistical tools and applications, analysis and interpretation of epidemiological data. Examples of applied epidemiology in the study of human infectious diseases.</li> <li>• Diagnostic/ prognostic epidemiological studies and Molecular epidemiology of infectious diseases: Laboratory methodologies and techniques for pathogen detection and infectious disease diagnosis, advantages and disadvantages. Basic concepts of molecular biology and evolution in infectious disease epidemiology. Modern molecular methods and "-omics" technologies, applications in epidemiological research and public health practice. Examples of molecular epidemiological studies on infectious diseases and pathogen evolution.</li> <li>• Epidemiology and Public Health: The role of CDC-WHO and the concept of One Health. Systems used for infectious disease reporting, monitoring, and risk assessment. The national surveillance system and mandatory notifiable infectious diseases. Ethical issues in epidemiological studies of infectious diseases (e.g. data management, privacy regulations).</li> <li>• Infectious disease epidemiology and Vaccination: The perennial value of vaccination infectious disease control and prevention. The national vaccination program, the role of randomized controlled trials in the process of vaccine development and evaluation, vaccination coverage, vaccine effectiveness and efficacy, vaccination hesitancy/ confidence.</li> </ul>		

	<ul style="list-style-type: none"> <li>• Global challenges: Antimicrobial resistance, emerging and re-emerging infectious diseases. Etiological factors, impact of globalization, climate and migration crisis. Special topics (indicative):             <ul style="list-style-type: none"> <li>- Mycobacterium tuberculosis (MDR/ XDR-TB, STOP-TB program).</li> <li>- HIV (the birth of AIDS pandemic, current status- global epidemic trends, contribution of antiretroviral treatment and chemoprophylaxis).</li> <li>- Pneumococcus, Staphylococcus (DRSP outbreaks, nosocomial MRSA).</li> <li>- Measles, mumps and rubella viruses (contribution of MMR vaccine).</li> <li>- Vector-borne diseases (e.g. malaria, leishmaniasis, West Nile fever, dengue, toxoplasmosis, echinococcosis, typhus, plague, Lyme disease), importance of eco-epidemiological studies, vector surveillance and control.</li> </ul> </li> </ul> <p><u>Practical exercises:</u></p> <ul style="list-style-type: none"> <li>• <b>Individual and group exercises on the epidemiology of infectious diseases.</b> Indicative exercises:             <ul style="list-style-type: none"> <li>(i) Descriptive cross-sectional epidemiological study, study design, development of research protocol and questionnaire. Measurement of epidemiological indicators (e.g. calculate incidence, prevalence, morbidity/ case-fatality rate, mortality/ mortality rate). Group exercise on various case studies followed by a short presentation of the exercise outputs.</li> <li>(ii) Analytical epidemiological study (a) Case-Controls, calculation of odds ratio, correlation testing, (b) Case series (prospective, retrospective), calculation of relative and attributable risk, causality. Group exercise on the investigation of an outbreak followed by a short presentation, describing determinants of disease outbreak, steps of epidemiological investigation, epidemic curve, attack rate, relative risk, control measures.</li> <li>(iii) Epidemiological investigation and surveillance of infectious diseases, data analysis. Investigate the causes, transmission mode, reservoir/ host of an emerging infectious disease. Group exercise on case studies (various pathogens/ infectious diseases) followed by a short presentation, describing the importance/ impact of disease in Public health, system and objective(s) of epidemiological surveillance, indicators and data, intervention measures.</li> </ul> </li> <li>• <b>Critical review of literature and scientific articles.</b> Indicative topics:             <ul style="list-style-type: none"> <li>(i) Epidemiological investigation and risk assessment for a waterborne or foodborne community outbreak (bacterial or parasitic).</li> <li>(ii) Overview of the epidemiology of an endemic infectious disease in Cyprus (bacterial, viral, parasitic or fungal).</li> <li>(iii) Risk assessment and intervention measures for an emerging vector-borne infectious disease in Europe.</li> </ul> </li> </ul>
Teaching Methodology	Teaching methodologies will include <b>lectures</b> using PowerPoint, image-rich material and short animations, and <b>practical sessions</b> to help the students comprehend the main concepts and applications of epidemiology in the investigation, surveillance, control and prevention of infectious diseases. <b>Individual and group exercises</b> , such as case study investigation and calculation of epidemiological indicators, will provide students the necessary practical skills and experience in applied epidemiology of infectious diseases. Regular open-discussion/ Q&A sessions will encourage students to participate, interact and develop critical thinking.
Bibliography	<u>Textbooks:</u>

	<p>Kramer A, Kretzschmar M. and Krickeberg K. (2010). Modern Infectious Disease Epidemiology. Concepts, Methods, Mathematical Models and Public Health. Springer New York.</p> <p>Jillian Murray J. and Cohen L. A. (2017) Infectious Disease Surveillance, International Encyclopedia of Public Health (2<sup>nd</sup> Edition), Academic Press.</p> <p>Aschengrau, A. Seage GR. (2018) Essentials of Epidemiology in Public Health (4<sup>th</sup> Edition), Jones &amp; Bartlett Learning.</p> <p>Τριχόπουλος Δ., Λάγιου Π.Δ. (2011) Γενική και Κλινική Επιδημιολογία: Αρχές, μέθοδοι και εφαρμογές στην ιατρική έρευνα και τη δημόσια υγεία. Επιστημονικές εκδόσεις Παρισιάνου.</p> <p>* Supplementary readings and journal articles will be assigned on a per lecture basis.</p>
Assessment	<p>For student evaluation, the overall grade is determined by:</p> <p><b>1. In-Class Activities and Mid-term Exam (20%):</b> Students are asked to actively participate at in-class activities and exercises. Supplementary course material, journal articles and exercises will be assigned for review/practice. Between the 6<sup>th</sup>-8<sup>th</sup> week an interim written exam will take place to examine specific topics, in the form of short answer, multiple choice and problem solving questions.</p> <p><b>2. Practical reports and exam (20%):</b> Students are expected to submit for evaluation a laboratory report for each individual or group exercise (in total 10%), describing the scope, methodology, data analysis and evaluation, findings and conclusions. The written laboratory examination (10%) will include short answer, multiple choice and problem solving questions.</p> <p><b>3. Final Exam (60%):</b> The final course examination will take place between the 14<sup>th</sup>-16<sup>th</sup> week of the semester and will examine the overall course content (lectures and exercises) in the form of short answer, multiple choice and problem solving questions.</p>
Language	Greek, English