

Syllabus template

Semester: I				
Course : Microbiology (MDS-Multidisciplinary)				
Paper Title: Microbes: Application, safety and ethics				
Paper code: M1MB230111T			Credits: 3	
Hours/week : 3 hours/week				
Category: Core/MDC/SEC/VAC : Multidisciplinary (MDS)				
Theory / Practical / Composite : Theory (Non composite)				
No of Modules : No modules				
<p>Course Overview: This course provides a comprehensive study of the history of the development of the field of microbiology to get the students acquainted with the terms, facts and concepts of microbiology.</p> <p>It also help understand the scope of microbiology, how different types of microscopes can be used to visualize microbes at different magnifications which aid in the process of understanding the microbial morphology and patterns. Further, this course create an understanding of the beneficial vis-a-vis harmful microbes, safety and ethics related to the use of microbes and also evaluate the medical, environmental ethics and patenting laws which can be applied while working with microbes.</p>				
Course Outcome:				
1. Remember the basic concepts of light and image formation, visualization of microbes				
2. Understand the basic history of the development of the field of microbiology.				
3. Apply the knowledge of the development of field and microscope in widening the scope of microbiology.				
4. Analyse safety, ethics and patenting norms while performing microbial work and use of microbial workstations.				
5. Evaluate the scope of microbiology				
6. Create better practical based understanding of how to work with microbes while being aware of safety and ethical norms.				
Prerequisites: <i>Basic knowledge about any prior course: 10+2 level of physics, chemistry and biology</i>				
SYLLABUS				
UNIT/Module	CONTENT	HOURS or NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL
	<p>History, Development and application of Microbiology - Development of Microbiology as a discipline, Spontaneous generation vs. biogenesis & abiogenesis. Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming. Role of microorganisms in fermentation,</p>	12 (in a semester)	CO1 CO2 CO3 CO4 CO5 CO6	K1,K2,K3,K4,K5, K6

	<p>Germ theory of disease, Development of various microbiological techniques and golden era of microbiology, Development of the field of soil microbiology: Contributions of Eminent scientists: Martinus W. Beijerinck, Sergei N. Winogradsky, Selman A. Waksman Establishment of fields of medical microbiology and immunology through the work of Paul Ehrlich, Elie Metchnikoff, Edward Jenner</p> <p><u>Beneficial/Harmful microbes & Ethical concepts of Natural Science</u> : Brief idea and application , beneficial and harmful microbes, How to protect ourselves-Principal of Biosafety Concept and safety, safety against radioactivity ,Basic principles and application and laws pertaining to patenting and its protection. General concepts of patents related to biological research products, Definition and types, Medical Ethics, Environmental Ethics</p> <p><u>An overview on Scope of Microbiology:</u> Brief knowledge about the scope and applications of microbiology in various fields.</p> <p><u>Observation and culture of microbes:</u> Microscopy: Basic Principles of microscopy related to microbiology including resolving power, magnification, numerical aperture, chromatic aberration and use of oil immersion objective. Working principle of bright field, dark field, phase contrast and fluorescent microscope. Difference between light and electron microscopes. Two types of electron microscope- TEM and SEM. Culture medium and Microbial culture: Culture medium- Solid and liquid culture medium. Concept of microbial growth in solid and liquid culture medium. Brief knowledge of pure culture, Methods of pure</p>	<p>18 (in a semester)</p>		
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	culture isolation and pure culture development.			
Text Books				
<p>Advanced Microbiology online MOOC course by Dr Arup Kumar Mitra https://onlinecourses.swayam2.ac.in/cec22_bt20/preview</p> <ul style="list-style-type: none"> ✓ Bare Act, 2007. Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., New Delhi. ✓ Kankanala C (2007). Genetic Patent Law & Strategy, 1st Edition, Manupatra Information Solution Pvt. Ltd. New Delhi. ✓ Singh K K (2015). Biotechnology and Intellectual Property Rights: Legal and Social Implications, Springer India. ✓ Goel D & Prashar S (2013). IPR, Biosafety and Bioethics. Pearson Senthil Kumar Sadhasivam ✓ Mohammed Jaabir, M. S. 2008. IPR, Biosafety and biotechnology Management. Jasen Publications, Tiruchirappalli, India 				
Suggested readings				
1. Fundamental of Light microscopy and Electronic Imaging-Douglas M Murphy John Wiley and Sons				
2.				
Web Resources				
1.				
2.				
3.				
4.				
Evaluation Theory CIA:15 Semester Exam:35; No Practical component is included in the course				
<p>Paper Structure for Theory Semester Exam Module : Full marks 35 7 questions out of 9 each 5 marks question</p>				

Course outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive levels
CO1	Remember the basic terms of history and development of Microbiology	K1, K2
CO2	Understand the basic concept of light propagation microscope	K2
CO3	Apply the understanding of microscopy in visualizing microbes	K3
CO4	Analyse the to identify beneficial harmful microbes	K4
CO5	Evaluate how microbiology can be studied after understanding safety, environmental ethics.	K5
CO6	Combine the knowledge of ethics, patents and safety norms along with the concept of the field of development of microbiology to establish norms for the study of microbiology using relevant culture media.	K6