136C1A Fundamentals of Microbiology Theory Summary

Course Units

Unit 1: Learn The Fundamental Principles About Different Aspects

• History and Evolution of Microbiology
• Classification – Three kingdom
• five kingdom
• six kingdom and eight kingdom. Microbial biodiversity: Introduction to microbial biodiversity- ecological niche. Basic concepts of Eubacteria
• Archaebacteria and Eucarya. Conservation of Biodiversity.

Unit 2: Describe The Structural Organization, Morphology And Reproduction

• General characteristics of cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) and acellular microorganisms - (Viruses, Viroids, Prions)
• Differences between prokaryotic and eukaryotic microorganisms. Structure of Bacterial cell wall
• cell membrane
• capsule
• flagella
• pili
• mesosomes
• chlorosomes
• phycobilisomes
• spores
• and gas vesicles. Structure of fungi (Mold and Yeast)
• Structure of microalgae.

Unit 3: The Methods Of Cultivation Of Microbes And Measurement

• Bacterial culture media and pure culture techniques. Mode of cell division
• Quantitative measurement of growth. Anaerobic culture techniques.

Unit 4: Microscopy And Other Basic Laboratory Techniques – Culturing

• Microscopy – Simple
• bright field
• dark field
• phase contrast
• fluorescent
• electron microscope – TEM & SEM
• Confocal microscopy
• and Atomic Force Microscopy. Stains and staining methods.

Unit 5: Compare And Contrast The Different Methods Of Sterilization

• Sterilization–moist heat - autoclaving
• dry heat – Hot air oven
• radiation – UV
• Ionization
• filtration – membrane filter and disinfection
• antiseptic; Antimicrobial agents.

Course Outcomes

CO1: Study the historical events that led to the discoveries and inventions and understand the Classification of Microorganisms.

CO2: Gain Knowledge of detailed structure and functions of prokaryotic cell organelles.

CO3: Understand the various microbiological techniques, different types of media, and techniques involved in culturing microorganisms.

CO4: Explain the principles and working mechanism of different microscopes/Microscope, their function and scope of application.

CO5: Understand the concept of asepsis and modes of sterilization and disinfectants.

Text Books

1. Pelczar.M. J., Chan E.C.S. and Noel. R.K. (2007). Microbiology. 7th Edition.,McGraw – Hill, New York.

2. Willey J., Sherwood L., and Woolverton C. J., (2017). Prescott's Microbiology. 10th Edition., McGraw-Hill International edition.

3. Tortora, G.J., Funke, B.R., Case,C.L. (2013). Microbiology. An Introduction 11th Edition., A La Carte Pearson.

4. Salle. A.J (1992). Fundamental Principles of Bacteriology. 7th Edition., McGraw Hill Inc.New York.

5. Boyd, R.F. (1998). General Microbiology,2nd Edition., Times Mirror, Mosby CollegePublishing, St Louis.

Reference Books

1. Jeffrey C. Pommerville., Alcamo's Fundamentals of Microbiology (9th Edition). Jones &Bartlett; learning 2010.

2. Stanier R.Y, Ingraham J. L., Wheelis M. L., and Painter R. R. (2010). General Microbiology, 5th Edition., MacMillan Press Ltd

3. Tortora, G.J., Funke, B.R. and, Case, C.L (2013). Microbiology-An Introduction, 11th Edition., Benjamin Cummings.

4. Nester E., Anderson D., Roberts C. E., and Nester M. (2006). Microbiology-A Human Perspective, 5th Edition. McGraw Hill Publications.

5. Madigan M.T., Martinko J.M., Stahl D.A, and Clark D. P. (2010). Brock - Biology of Microorganisms, 13th Edition Benjamin-Cummings Pub Co.

Web Resources

1. https://www.cliffsnotes.com/study-guides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology
2. https://www.keyence.com/ss/products/microscope/bz-x/study/principle/structure.jsp
3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6604941/#
4. https://bio.libretexts.org/@go/page/9188
5. https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial- nutrition/