Bot. Sp-22 ENVIRONMENTAL BACTERIOLOGY Credit Hours 3(2+1)

Introduction of the Course

The course is designed to enable the students to be familiar with the role played by the bacteria in the environment. Environmental bacteriology involves the study about the ecology of bacteria, their relationship with one another and with their environment, the beneficial and hazardous role of bacteria in the environment and how laws and biosafety guide lines should be implemented in order to maintain healthy environment. Bacteria play primary role in regulating biogeochemical systems on our planet including some of the most extreme regions, from frozen environments and acidic lakes, to hydrothermal vents at the bottom of deepest oceans, and some of the most familiar, such as the human small intestine. After studying the subject of Environmental Bacteriology, students will be able to define the beneficial and harmful effects of microorganisms on individual health, public health, food and water quality.

Course Objectives

1. To make the students aware of the role played by bacteria (both beneficial and harmful) in the environment
2. To understand the impact of various environmental factors on the growth of bacteria

Contents

Unit I: Introduction to Environmental Bacteriology
Unit-II: Effect of environmental factors on bacteria
Unit- III: Biogeochemical cycle involving Bacteria.
Unit- IV: Environmental laws and Biosafety guide lines.
Unit- V: Molecular approaches to the environmental management.
Unit- VI: Bacterial Biodegradation of xenobiotics.
Unit- VII: Microbial resistances, transformation and detoxification of pollutants.
Unit- VIII: Biofilms: introduction and applications.
Unit- IX: Environmental law and management.
Unit- X: Mineral leaching with bacteria

Practicals:

1. Study of effects of environmental factors on the bacterial growth.
2. Study of effect of pollutants on bacterial growth.
3. Determination of reduction potential of heavy metals by bacteria.
4. Antibiotic resistance of bacteria

Teaching-learning Strategies

1. Lectures
2. Group Discussion
3. Laboratory Work
4. Seminar/ Workshop

Assessment and Examinations:

As per University Rules

Recommended Readings

1. Alcamo, I. E. (2022). *Fundamentals of Microbiology.* (12th Ed.), Jones & Bartlett Publishers, USA.
2. Barnett, V. (2003). *Environmental Statistics: Methods and Applications*. John-Wiley and Son Limited.ss
3. Bertrand, J. C., Caumette, P., Lebaron, P., Matheron, R., Normand, P., & Ngando, T. S. (Eds.). (2015). *Environmental microbiology: fundamentals and applications* (pp. 3-7). Dordrecht: Springer.
4. Black, J.G. (2017). *Microbiology*: Principles & Explorations, (10th Ed.), Publisher McGraw Hill.
5. Borlak, J. (2005). *Handbook of Toxicogenomics: Strategies and Applications*. John-Wiley and Sons Limited.
6. Canter, L. (1996). *Environmental Impact Assessment*. McGraw-Hill Science. ISBN: 0070097674
7. Cunningham, W.P. and Cunningham, M.A. (2020). *Principles of Environmental Science Inquiry and Applications.* (9th Ed.) McGraw-Hill Science.
8. Grant, W. D., & Long, P. E. (2013). *Environmental microbiology*. Springer Science & Business Media.
9. Heikki, M., Hokkanen, T. and Hajek, A.E. (2004). *Environmental Impacts of Microbial Insecticide: Needs and Methods for Risk Assessment*, Science Publishers.
10. Ivanov, V. (2016). *Environmental microbiology for engineers*. CRC press.
11. Maier, M.R. Pepper, L.I., and Gerba, P.C. (2014). *Environmental Microbiology.* (3rd Ed.), Elsevier

Inc, U.K.
12. Méndez-Vilas, A. (Ed.). (2014). *Industrial, medical and environmental applications of microorganisms: current status and trends*. Wageningen Academic Publishers.
13. Mitchell, R. (2010). *Environmental Microbiology*. John Wiley & Sons Carde.
14. Pepper, I. L., Gerba, C. P., Gentry, T. J., & Maier, R. M. (Eds.). (2011). *Environmental microbiology*. Academic press.
15. Rubin, E.S. (2001). *Introduction to Engineering and the Environment*. McGraw-Hill Science.
16. Schmidt, T. M. (Ed.). (2019). *Encyclopedia of Microbiology*. Academic Press.
17. Sunahara, G.I., Agnes Y., Renoux, A.Y., Thellen, C., Gaudet, C.L., and Pilon, A. (2002). *Environmental Analysis of Contaminated Sites.* John-Wiley and Son Limited.
18. Talaro, K.P. (2022). *Foundations in Microbiology:* Basic Principles. (11th Ed.) McGraw Hill. Publisher.
19. Tickner, J.A. (2002). *Precaution, Environmental Science, and Preventive Public Policy.* Island press.
20. Tortora, G.J., Christine L., Case, C.L., Funke, B.R., Funke, B. and Case, C. (2022). *Microbiology*: An Introduction. (13th Ed.), Pearson Education Publishers.

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