
Preface

Microorganisms play an important role in natural or engineered protection of an environment from chemical or biological pollution, and they can restore a polluted or degraded environment. Microorganisms or their products can also be used in construction to improve the mechanical properties of the ground and building materials. At the same time, engineers have to design the technologies to inhibit microorganisms from causing diseases in humans, animals, and plants and to prevent microbially induced deterioration or corrosion. Therefore, both the civil and environmental engineering fields include many engineering solutions that are based on the relevant knowledge of microbiology. However, a general knowledge of biological science will not suffice; rather, this knowledge must be tightly connected to specific engineering problems.

This book is intended for undergraduate and graduate students at civil and environmental engineering schools and departments of universities. It covers essential topics for environmental engineering such as diversity and functions of microorganisms in environmental engineering systems and processes, applied microbial genetics and molecular biology, microbial biodegradation of organic substances, public health microbiology for environmental engineers, microbiology of water and wastewater treatment, biotreatment of solid waste, and soil bioremediation. In addition, the scope of this book includes essential topics for civil engineering processes such as biodeterioration, biocorrosion, bioclogging, biocementation, and microbially treated construction materials. The objective is to provide a practical understanding of microorganisms and their functions in environmental engineering systems or the civil engineering process. To enhance this understanding, the author has provided several tutorials, quiz questions in every chapter, and a bank of exam questions, with solutions available upon request of the lecturers. The principal intention of these tutorials, quizzes, and exam questions with solutions is to help engineers perform the necessary design calculations for microbial engineering activities. In this book, the tutorial questions and their solutions, as well as exam questions, are placed in the separate chapter to be used in classes, but they can be used as homework problems as well.