

## **Medical Microbiology**

1. Study antibiotic resistance in common bacteria.
2. Effectiveness of probiotics in preventing infections.
3. Identify methicillin-resistant *Staphylococcus aureus* (MRSA).
4. Impact of hygiene on hospital infections.
5. Test new antibiotics against drug-resistant bacteria.
6. Compare bacterial and viral infections in weakened immune systems.
7. Explore how bacteria cause tuberculosis.
8. Compare different antiseptics for wound care.
9. Role of gut bacteria in recovery after antibiotics.
10. New vaccines for emerging infections.

## **Environmental Microbiology**

11. How microbes break down pollutants.
12. Microbes in cleaning up oil spills.
13. Study microbes in different soil types.
14. Effect of heavy metals on soil microbes.
15. Microbes in wastewater treatment.
16. Role of microbes in composting.
17. Climate change effects on microbial life.
18. Water quality indicators by microbes.
19. Microbes in extreme environments.
20. Microbial fuel cells and renewable energy.

## **Industrial Microbiology**

21. How microbes produce antibiotics.
22. Making biofuels from waste using microbes.
23. Genetically engineered bacteria for enzymes.
24. Microbes in food fermentation.
25. Yeast in bioethanol production.
26. Microbes making bioplastics.
27. Microbial production of vitamins.
28. Enzymes from microbes for textiles.
29. Probiotics in the food industry.
30. Microbes transforming pharmaceuticals.

## **Agricultural Microbiology**

31. Fungi aiding plant growth.
32. Microbes for better soil fertility.

33. Using microbes to control plant diseases.
34. How soil microbes affect crop yield.
35. Soil bacteria in different farming methods.
36. Bacteria that help plants grow.
37. Microbes fixing nitrogen in plants.
38. Using biofungicides for plants.
39. Soil microbes in crop rotation.
40. Microbial agents for pest control.

## **Food Microbiology**

41. Detecting foodborne pathogens.
42. Role of bacteria in food preservation.
43. Microbes in fermented foods.
44. Effect of food processing on microbes.
45. Antimicrobial agents in food safety.
46. Contamination in dairy products.
47. Quick tests for foodborne pathogens.
48. Yeast in bread and beverages.
49. Storage effects on food quality.
50. Probiotics in functional foods.

## **Virology**

51. Role of viruses in diseases.
52. Developing vaccines for new viruses.
53. How viruses replicate.
54. Effects of antiviral drugs.
55. Chronic viral infection mechanisms.
56. Viruses and cancer.
57. Differences between DNA and RNA viruses.
58. Using bacteriophages to fight bacteria.
59. Viral mutations and drug resistance.
60. Viral vectors for gene therapy.

## **Biotechnology and Genetic Engineering**

61. Genetically modifying microbes for better performance.
62. Using CRISPR in microbial genetics.
63. Creating biosensors with engineered microbes.
64. Building synthetic microbes.
65. Microbial gene expression in research.
66. Plasmids in gene transfer.
67. Exploring microbial communities through metagenomics.

68. Producing proteins with engineered microbes.
69. Bioinformatics for microbial data.
70. Gene editing in agriculture.

## **Microbial Physiology and Biochemistry**

71. Enzymes from extreme microbes.
72. Metabolism in bacteria without oxygen.
73. Secondary metabolites and microbial interactions.
74. Biofilm formation in infections.
75. Carbohydrate metabolism in microbes.
76. Stress responses in microbes.
77. Protein secretion systems in bacteria.
78. Antibiotic resistance mechanisms.
79. Microbial metabolic products for industry.
80. Microbial pigments and adaptation.

## **Microbial Genetics**

81. Bacteria adapting to environmental changes.
82. Gene transfer between bacteria.
83. Mobile genetic elements in bacteria.
84. Antibiotic resistance genes in bacteria.
85. Studying microbial operons.
86. Using transposons to study genes.
87. Comparing genes in different bacteria.
88. Epigenetic changes in microbes.
89. Microbial genetic diversity.
90. Gene expression under stress.

## **Host-Microbe Interactions**

91. Gut microbiota and health.
92. Immune responses to infections.
93. Microbes and host metabolism.
94. Microbial colonization effects on host development.
95. Pathogen interactions in chronic diseases.
96. Microbes influencing host genes.
97. Microbiota in autoimmune diseases.
98. Host factors affecting microbial virulence.
99. Gut microbiota and mental health.
100. Targeting microbial virulence in drug development.

## **Mycology**

101. Fungal species in different environments.
102. Pathogenic fungi and diseases.
103. Fungi's role in nutrient cycling.
104. Antifungal resistance.
105. Fungi in biotechnology.
106. Mycorrhizal fungi and plant relationships.
107. Identifying soil fungi.
108. Climate change effects on fungi.
109. Natural antifungal agents.
110. Fungal genomics and medicine.

## **Parasitology**

111. Lifecycle and control of protozoa.
112. Worm parasites and diseases.
113. Detecting parasitic infections.
114. Parasitic diseases and public health.
115. Drug resistance in parasites.
116. Vaccines for parasitic diseases.
117. Parasite interactions with vectors.
118. Environmental factors in parasitic spread.
119. Protozoa vs. non-parasitic protozoa.
120. Managing livestock parasites.

## **Microbial Ecology**

121. Microbes in extreme environments.
122. Microbes in the carbon cycle.
123. Microbial species interactions in habitats.
124. Environmental changes affecting microbial diversity.
125. Microbial changes in disturbances.
126. Microbes in aquatic nutrient cycles.
127. Microbial communities in the human body.
128. Microbial impacts on ecosystems.
129. Marine microbial symbiosis.
130. Pollution effects on microbes.

## **Synthetic Microbiology**

131. Engineering microbes to clean toxins.
132. Creating synthetic microbial communities for monitoring.
133. Designing gene circuits in microbes.
134. Microbes producing valuable substances.
135. Synthetic ecosystems for agriculture.

136. Synthetic biology in drug discovery.
137. Biosensors from synthetic microbes.
138. Microbial solutions for wastewater.
139. Microbes for sustainable energy.
140. Creating artificial microbial life.

## **Microbial Pathogenesis**

141. Bacteria avoiding immune responses.
142. Fungal disease mechanisms.
143. Pathogens affecting host cell signaling.
144. Toxins in microbial diseases.
145. Comparing virulence factors in pathogens.
146. Host genetics and infection susceptibility.
147. Drug resistance in pathogens.
148. Chronic infections and biofilms.
149. Targeting pathogen virulence in drugs.
150. Host microbiota's role in infections.

## **Microbial Biotechnology**

151. Microbes in diagnostic tools.
152. Extremophiles in biotechnology.
153. Microbes making high-value chemicals.
154. Microbes for environmental monitoring.
155. Recycling with microbial processes.
156. Microbial enzymes in industry.
157. Microbes for therapy applications.
158. Agriculture and microbial pest control.
159. Tools for microbial data analysis.
160. Microbes for improved crop productivity.

## **Microbial Cell Biology**

161. Microbial cell growth and division.
162. Microbes adapting to stress.
163. Microbial cell walls and infections.
164. Protein secretion in bacteria.
165. Microbial communication pathways.
166. Microbial organelles and functions.
167. Cellular responses to stress.
168. DNA repair in microbes.
169. Microbial cytoskeleton roles.
170. Microbial internal compartments.

## **Microbial Evolution**

171. Evolution in microbial populations.
172. Gene transfer and evolution.
173. Pathogens evolving with host defenses.
174. Genomic comparisons in microbes.
175. Evolution of antibiotic resistance.
176. Environmental changes affecting evolution.
177. Evolutionary traits in extremophiles.
178. Phylogenetics of microbes.
179. Evolution of virulence factors.
180. Microbial evolution through metagenomics.

## **Microbial Technology and Innovation**

181. New fermentation techniques.
182. Innovations in microbial fuel cells.
183. Advanced biosensors with microbes.
184. Microbes making valuable compounds.
185. Nanotechnology in microbial research.
186. High-throughput microbial screening.
187. Microbes for environmental cleanup.
188. Advanced imaging of microbes.
189. New diagnostic tools with microbes.
190. Microbial solutions for agriculture.

## **Microbial Diversity and Taxonomy**

191. Identifying new microbial species.
192. Diversity in extreme environments.
193. Microbial taxonomy in various habitats.
194. Microbes in human-associated environments.
195. Culture-independent taxonomy methods.
196. Microbial diversity in ecosystems.
197. Rare microbial species study.
198. Soil microbial taxonomy.
199. Phylogenetics of microbial species.
200. Environmental changes and microbial diversity.