

**GENERIC ELECTIVES (GE-9): Microbiota: Importance in Health and Disease
Zoo-GE-9**

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course	Department offering the course
		Lecture	Tutorial	Practical			
Microbiota: Importance in Health and Disease Zoo-GE-9	04	02	Nil	02	Passed Class XII with Biology/ Biotechnology	NIL	Zoology

Learning Objectives

The learning objectives of this course are as follows:

- to acquaint students with the basic concepts of microbiota that coexist with the human being both in health and in different pathologies.
- To enable students to understand how microbiota undergoes changes as a consequence of the influence of multiple factors, diet, lifestyle, pharmacological treatments generating alterations in this bacterial ecosystem.
- To compare the role of our microbiota in behavior, mood, and development.
- to make the students aware of the microbial communities that reside within or upon us, and how they impact our health.
- To acquire knowledge about the interactions between the different types of microbiota and their host in different pathophysiological situations.

Learning Outcomes

By studying this course, students will be able to

- Identify the components of the human microbiota and their major characteristics.
- Learn the key approaches and techniques used to identify and quantify the bacterial, fungal, archaeal, protozoan, and viral components of the microbiota.
- Identify the common members of the microbiota and their influence on various body systems including the skin, upper and lower respiratory system, oral and the lower digestive system, urinary and reproductive systems, the immune system, and the nervous system in healthy and diseased states.
- Compare the role of our microbiota in behavior, mood, and development.
- Appreciate the emerging treatment approaches for microbiota-associated illnesses.

SYLLABUS OF GE-9

UNIT- 1: Microbes

4 hrs

Introduction to microbes, general approaches and techniques used for studying microbiota, the nature of microbiological problems, Prokaryotic and eukaryotic organisms.

UNIT- 2: Introduction to the Human Microbiome

16 hrs

Importance of human body environment for growth of a variety of microorganisms, concept of contamination, infection and disease, septicaemia, Acute and subacute bacterial endocarditis.

a) Microbial Diseases of the Respiratory System: Tuberculosis; Common cold,

b) Microbial Diseases of the Eyes: Conjunctivitis, Trachoma; Viral Diseases of the Eye.

c) Microbial Diseases of skin: Bacterial diseases of the skin: Acne, folliculitis, boils, cellulitis, Infections of burns and surgical wounds, gangrene, Leprosy. Viral Diseases of the Skin: Chicken pox;

Fungal Diseases of the Skin: Candidiasis.

d) Microbial Diseases of the Nervous System: Bacterial diseases: Tetanus, Viral diseases: Polio/Rabies; Protozoan diseases: Trypanosomiasis

e) Microbial Diseases of the Oral Cavity and Digestive System: Bacterial diseases: Dental caries; Cholera, Gastroenteritis; Fungal diseases: Aflatoxin poisoning, Ergot poisoning; Viral diseases: Mumps; Protozoan diseases: Amoebic dysentery, Giardiasis

f) Microbial Diseases of the Urinary/Reproductive Systems: Bacterial diseases: Syphilis; Viral diseases: genital warts; Protozoan diseases: Trichomoniasis; Fungal diseases: Vaginitis

UNIT- 3: Microbiota and the Immune System Development

5 hrs

Normal flora, transient flora opportunistic microbes, Pathogenicity, virulence, and factors that increase virulence (enzymes, toxins), Factors that affect the spread of disease, Nonspecific immune responses, Specific immune responses: humoral and cell mediated immunity

UNIT- 4: Human Microbiota in Health and Disease

5 hrs

Basic concept of Gut microbiota in the mother-child environment, Gut microbiota and cancer; Microbiota and viral diseases- An opportunity for COVID-19. Relationship between diet and the intestinal microbiota, Probiotics, prebiotics and other "biotics".

Practical

(60 hrs)

(Laboratory periods: 15 classes of 4 hours each)

1. Bacterial shapes and arrangements Cell wall, Cell membrane, Glycocalyx, Endospores, Flagella, Cytoplasmic inclusions, Cytoplasmic structures/organelles, Bacterial growth curve, Physical factors affecting microbial growth.
2. To understand Good Lab practise: The effectiveness of hand washing and sterilization.
3. To understand microbial morphology by Gram Staining.
4. To appreciate bacterial anatomy by Acid-fast Staining.
5. Environmental Factors affecting growth of microorganisms: Temperature, pH and Osmotic Pressure.
6. Bacterial growth curve and evaluation of factors affecting microbial growth.
7. Isolation of normal microbiota from the human Body (Nose, Throat, or Skin).
8. Effects of chemical agents on bacteria growth (Kirby-Bauer method).

Essential/recommended readings

1. Leboffe, M. J and Pierce; B. E. (2014) A Photographic Atlas for the Microbiology Laboratory, 5th Edition, Morton Publishing Company.
2. Michael Wilson (2005) "Microbial Inhabitants of Humans-Their Ecology and Role in Health and Disease"; Oxford University Press, UK.

Suggestive readings

1. Nina Parker, Mark Schneegurt, Anh-Hue-Thi Tu and Brian M. Forster; (2016) "Microbiology"; 1st Edition, OpenStax Resource.

NOTE: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.