| **Department of Microbiology** | |
|---|---|
| Programme Outcome | Microorganisms exist virtually everywhere life is possible. The total complement of microbial cells in and on our body—microbiome—contains thousands of species each adapted to grow best in a particular part of our body. The whole biosphere depends on the activities of microorganisms and they influence human society in countless ways. Because microorganisms play such diverse roles, modern microbiology has a great impact on different fields such as medicine, agricultural and food sciences, ecology, genetics, biochemistry and molecular biology. Upon graduation, the students will be able to acquire, retain and apply specialized concept and knowledge relevant to plethora of microbiological field. They will also acquire knowledge in laboratory safety and in routine and specialized microbiological skills applicable to clinical research, including accurately reporting observations and analysis. The course will help them to impart the knowledge of the basic principles of bacteriology, virology, mycology, immunology and parasitology including the nature of pathogenic microorganisms, pathogenesis, laboratory diagnosis, transmission, prevention and control of diseases common in the country. They will acquire the ability to function effectively on teams to accomplish a common goal. The students will be able to communicate scientific concepts, experimental results and analytical arguments clearly and concisely, both verbally and in writing. The course is reasoning and application based, making the students eligible for higher studies, jobs in various sectors and entrepreneurship abilities. |
| Programme Specific Outcome | The core course is emphasized on morphology, physiology and function of microorganisms in addition to several subjects including biochemistry, cell biology, immunology, virology, molecular biology and recombinant DNA technology. On successful completion of graduation, the students will gain insight of microbiology starting from history, basic laboratory techniques and fundamental knowledge about the microorganisms. They will acquire the skill in the use and care of basic microbiological equipment; performance of basic laboratory procedures in microbiology; proper collection and forwarding of microbiological and parasitological specimens to the laboratory. They will be well-informative about the integral role of microorganisms associated with specific disease, vital role of microorganisms in biotechnology, fermentation, medicine, and other industries important to human well being. The skill enhancement elective course is designed to provide students with an opportunity to gain hands on experience in state-of-the-art laboratory equipments that could enrich them to perform high throughput research on microorganisms and execute diagnostic procedures required in food, dairy and pharmaceutical industries. This course will also help them to comprehend and write effective project reports in multidisciplinary environment. It will also help to the development of sound attitudes in relation to the role of medical microbiology in clinical and community medicine. |
| **Course Outcomes** | |
| **Course** | **Outcomes** |
| Introduction to microbiology and microbial diversity | Learning the scientific methods and the history of science is the embodiment of scientific knowledge .As an introductory part of Microbiology, students will get the basic ideas and practices from the |

| | |
|---|---|
| | contribution of several Microbiologists in the field of microbiology. They will have to know the diversity of microbial world like algae, fungi, protozoa and their general characteristics and importances. They will be understood various laboratory practices, biosafety and also know the applications of important instruments like biological safety cabinets, autoclave, incubator, BOD incubator, hot air oven, light microscope, pH meter. |
| Bacteriology | Bacteriology has allowed students in the field of better understanding of bacteria and their characteristics in terms of identification, classification, growth and reproduction etc. Students will have to identify the bacteria by using different bacterial staining methods. They will be able to learn bacterial systematic, microscopy and several methods of isolation and preservation of different bacterial cultures. |
| Biochemistry | Here students will have to know the Properties of water, Concept of pH and buffers, preparation of buffers and Numerical problems on calculations of Standard Free Energy Change and Equilibrium constant and also Standard Free Energy Change of coupled reactions. Students will have to acquire the clear cut knowledge regarding the properties, functions, structures of different bio-molecule like Carbohydrates, Lipids, Proteins, Enzymes and Vitamins. Students will be able to run various biochemical tests like qualitative or quantitative tests for carbohydrates, reducing sugars, non reducing sugar, Lipids, and proteins. They will have to study the protein secondary, tertiary structures, enzyme kinetics – calculation of Vmax, Km, Kcat values and effect of temperature, pH and heavy metals on enzyme activity. |
| Virology | Students will be able to learn the nature, structure, general properties and their importance of different animal and plant viruses. They will also know about Viral Transmission, Salient features of viral nucleic acids, Replication and also several disease caused by viruses and the way of preventation. |
| Microbial physiology and metabolism | Students will have to acquire the clear cut knowledge of microbial growth and effect of environmental factors (like pH, temperature, salt concentration etc.) on microbial growth, nutrient uptake and transport, aerobic, anaerobic respiration, fermentation and at the same time phototrophic metabolism and nitrogen metabolism. |
| Cell Biology | To studying this course students get benefited by knowing the structure and function of various cell organelles of the eukaryotic cells. They will also get the thorough knowledge about cell cycle, cell signaling pathways. They will be able to get the practical knowledge of cell division, polyploidy by studying different stages of Mitosis and meiosis. |
| Molecular Biology | Molecular Biology will allow students to know the genetic material , structures of DNA and RNA, central dogma of life which includes replication of DNA (prokaryotes and eukaryotes), translation (prokaryotes and eukaryotes, transcription in prokaryotes and eukaryotes, post-transcriptional processing.Students will be able to isolate RNA and genomic DNA from *E.Coli*. They will have to know the practical knowledge and technique about Agarose Gel Electrophoresis and Polyacrylamide Gel Electrophoresis (SDS-PAGE). |
| Microbial Genetics | Through the course students will be acquainted with genome organization |

| | |
|---|---|
| | and mutations, different plasmids, mechanisms of genetic exchange, phage genetics and transposable elements |
| Environmental Microbiology | Students will be able to know about water potability, microbial bioremediation, waste management, biogeochemical cycling and different microbial interactions. |
| Food & Diary Microbiology | By the study of food & diary microbiology the students are able to know the principles and methods of food preservation, production of different fermented foods, different food borne diseases: their causative agents, foods involved, symptoms and preventive measures. They will have the know food sanitation and control. The students will know about the cultural and rapid detection methods of food borne pathogens in foods and introduction to predictive microbiology. |
| Immunology | Through the study of immunology the students will aware of antigens, antibodies, complement System, major histocompatibility Complex, different immune cells and organs. They will also able to know about the generation of immune response, immunological disorders and tumor immunity. By practically they will capable to perform different immunological techniques like - , Immunodiffusion, Immunoelectrophoresis, ELISA, Western blotting etc. |
| Industrial Microbiology | Student will be able to isolate the industrially important microbial strains and fermented media. They also have the knowledge about the fermentation processes, bio-reactors and measurement of fermentation parameters. They also well-known about microbial production of industrial products & enzyme immobilization. |
| Medical Microbiology | Students will acquire a thorough knowledge about the diseases caused by various bacteria, virus, protozoa and fungi. They also enrich about the antimicrobial agents, their characteristics, mode of action etc. They will acquire a clear understanding about host pathogen interaction, normal microflora in human body, different sample collection & diagnosis. They will also enrich by hands on training about this techniques through these practical classes. |
| Recombinant DNA Technology | Through completion the course the students will capable the acquire the knowledge about the genetic engineering, different methods in molecular cloning, DNA amplification, DNA sequencing, Construction and Screening of Genomic and cDNA libraries and its applications. |