

PROGRAMME SPECIFIC OUTCOME (PSO)

B Sc BIOCHEMISTRY AND INDUSTRIAL MICROBIOLOGY

After successful completion of the programme a student will acquire/develop following competencies:

1. Acquire knowledge and understanding of the microbiology concepts as applicable to diverse areas such as medical, industrial, environment, genetics, agriculture, food and others.
2. Demonstrate key practical skills/competencies in working with microbes for study and use in the laboratory as well as outside, including the use of good microbiological practices.
3. Competent enough to use microbiology knowledge and skills to analyze Problems involving microbes, articulate these with peers/ team members/ other stake holders, and undertake remedial measures/ studies etc.
4. Develop a broader perspective of the discipline of Microbiology to enable them to identify challenging societal problems and plan his professional career to develop innovative solutions for such problem.

**DEPARTMENT OF BIOCHEMISTRY AND INDUSTRIAL
MICROBIOLOGY**

SEMESTER 1

| COURSE CODE | COURSE NAME | COURSE OUTCOME | |
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| EN 1111.4 [| LANGUAGE SKILLS | CO1 | English as an acquired language for undergraduate students is to be mastered with focus on learning the basic skills of listening, speaking, reading and writing the language proficiently. |
| | | CO2 | This course aims to impart these skills in an interactive manner along with classroom activities and using the text as a resource for self-study as well. |
| | | CO3 | Discursive Practice as the learning and teaching method for this course, will encourage teachers to localise and personalise learning of English for students in undergraduate classrooms |
| | | CO4 | The course will equip the students with basic language skills along with improved non-verbal skills thereby improving their employability quotient. |
| ML 1111.3 | GADHYA SAHITHYAM | CO1 | <p>മലയാളത്തിലെ നോവൽ, ചെറുകഥ, ഉപന്യാസം, പഠനം, ജീവചരിത്രം, ആത്മകഥ, യാത്രാനുഭവം ഇവയെ പരിചയപ്പെടുന്നതുവഴി മലയാളഗദ്യത്തിന്റെ വിവിധ മാതൃകകൾ മനസ്സിലാക്കുന്നു.</p> <p>ഭാഷയുടെ പ്രയോഗസാധ്യതകൾ പ്രമേയവൈവിധ്യങ്ങൾ ഇവ വിദ്യാർത്ഥികൾ വിശകലനവിധേയമാക്കുന്നു.</p> <p>കൃതികളുടെ സാംസ്കാരികവും സാമൂഹികവുമായ നിലപാടുകളുമായി സംവദിക്കുക വഴി ഗദ്യസാഹിത്യത്തിന്റെ സൗന്ദര്യാത്മകമായ സവിശേഷതകൾ തിരിച്ചറിയാനും വിലയിരുത്താനുമുള്ള പ്രാപ്തി കൈവരുന്നു.</p> <p>ഭാഷാശുദ്ധി, തർജ്ജമ, ഉപന്യാസരചന ഇവയിലൂടെ നല്ല മലയാളമെഴുതാൻ വിദ്യാർത്ഥികൾ പ്രാപ്തി നേടുന്നു. സൃഷ്ടിവൈഭവവും പ്രയോഗവൈദഗ്ദ്ധ്യവും നേടുന്നു.</p> |
| HN 1111.3 | HINDI GADYA SAHITYA | CO1 | Appreciate course forms |
| | | CO2 | Understands the difference between the prose forms of the module |
| | | CO3 | Critically evaluate the literary text |
| AR 1111.1 | FUNCTIONAL ARABIC -1 | CO1 | Developing communication skills and inculcating values of communication among the students. |
| | | CO2 | Acquiring mastery of Arabic with efficient communicative skills and expressive capabilities. |

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| | | CO3 | Familiarizing with situation language and situation vocabulary in the different domains of life |
| | | CO4 | Understanding and acquiring knowledge of employing language in real life occasions |
| IM 1121 | BIOMOLECULES | CO1 | List out the contributions of popular scientist in the field of biochemistry. |
| | | CO2 | Describe the classification, structure and chemical properties of biomolecules, including carbohydrate ,lipids ,protein, amino acids and nucleic acid. |
| IM 1121 | PRACTICAL- 1 | CO1 | |
| IM 1171 | FUNDAMENTALS OF MICROBIOLOGY | CO1 | Get acquainted with contributions of various scientists. |
| | | CO2 | Gain knowledge about microscopy and general characters of microorganisms. |
| | | CO3 | Acquainted with staining techniques. |
| | | CO4 | Explore basic techniques of microbiology |
| | | CO5 | Identify the shapes of microbes and cultivate microbes in the lab. |
| | | CO6 | Identify the shapes of microbes and cultivate microbes in the lab. |
| IM 1171 | VOCATIONAL PRACTICALS-1 | CO2 | general microbiology laboratory |
| | | CO2 | Understand the working of common instruments in Microbiology laboratory. |
| | | CO3 | Understand the preparation of media used in Microbiology laboratory |
| | | CO4 | Identify microscopic morphology of microorganisms |

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| | | CO3, CO6 | Acquire skills to isolate microorganisms |
| | | CO2 CO3 | Understand the cultural characteristics of microorganisms |
| CH 1131.7 | BASIC THEORETICAL AND ANALYTICAL CHEMISTRY | | To understand the basic ideas of atomic structure, chemical bonding and nuclear chemistry |
| | | | To understand the basic principles of volumetric analysis |
| | | | To develop interest in spectroscopic methods of analysis and creating scientific awareness of environmental chemistry. |

SEMESTER 2

| COURSE CODE | COURSE NAME | COURSE OUTCOME | |
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| EN 1211.3 | ENGLISH GRAMMAR USAGE AND WRITING | CO1 | Have an appreciable understanding of English grammar. |
| | | CO2 | Produce grammatically and idiomatically correct spoken and written discourse |
| | | CO3 | Spot language errors and correct them |
| ML 1211.3 | DRISHYAKALASAHITHYAM | CO1 | <p>സാഹിത്യകൃതികളും ദൃശ്യകലകളും തമ്മിലുള്ള ബന്ധം മനസ്സിലാക്കുന്നു.</p> <p>കേരളീയ ദൃശ്യകലകൾ നിരീക്ഷിച്ച് സാജാത്യവൈജാത്യങ്ങൾ കണ്ടെത്തുവാൻ സാധിക്കുന്നു.</p> <p>സ്വന്തം കലാവാസനകൾ ഉണരുകയും സ്വയം പരിശീലിച്ച് പ്രകടിപ്പിക്കാൻ പ്രേരണയുണ്ടാവുകയും ചെയ്യുന്നു.</p> <p>എഴുത്ത്, അഭിനയം, സംവിധാനം തുടങ്ങിയ കലാപരമായ ഇടപെടലുകളിൽ സന്നദ്ധതയുണ്ടാകുന്നു.</p> <p>ആസാദനശേഷി വർദ്ധിക്കുകയും കലാരൂപങ്ങളെ വിമർശനാത്മകമായി വിലയിരുത്തുകയും ചെയ്യുന്നു.</p> |
| SHN 1211.3 | HINDI PADYA SAHITYA | CO1 | Understand aesthetics of Ancient Hindi poetry. |

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| | | CO2 | Understand the history of Bhakti poetry. |
| | | CO3 | Recollect the major works of poets |
| | | CO4 | Appreciate the creativity of Ancient poets |
| | | CO5 | Critically evaluate the contribution of the ancient poets to Hindi Literature. |
| AR 1211.1 | FUNCTIONAL ARABIC 2 | CO1 | Developing communication skills and inculcating values of communication among the students. |
| | | CO2 | Acquiring mastery of Arabic with efficient communicative skills and expressive capabilities |
| | | CO3 | Familiarizing with situation language and situation vocabulary in the different domains of life |
| | | CO 4 | Understanding and acquiring knowledge of employing language in real life occasions |
| IM 1241 | ENVIRONMENTAL STUDIES | CO1 | Understand environmental systems |
| | | CO2 | Understand the biodiversity and conservation concepts |
| | | CO3 | Remember concepts of biodiversity and conservations |
| | | CO4 | Understand natural systems and resources |
| | | CO5 | Apply pollution management technique |
| IM 1242 | PRACTICALS-QUALITATIVE ANALYSIS OF BIOMOLECULES | | |
| IM 1222 | MICROBIAL TAXONOMY AND PHYSIOLOGY | CO2 | Know about basics of microbial classification, taxonomy |
| | | CO3 | Explore the taxonomy, characters, life cycle and economic importance of Fungi, algae, protozoa with representative types. |
| | | CO3 | Gain knowledge about growth and key factors influencing the growth of microorganisms. |
| | | CO4 | Distinguish the Microorganisms based on their nutritional requirements and transport mechanisms of nutrients uptake |

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| | | CO4 | Be acquainted applications of bioluminescence |
| IM 1271 | MICROBIAL PHYSIOLOGY AND CULTURE TECHNIQUES | CO3 & CO4 | Identify standard methods for the isolation, identification and culturing of microorganisms. |
| | | CO3 & CO4 | Comprehend the ubiquitous nature of microorganisms and identify the different groups of microorganisms from different habitats and their applications. |
| | | CO3 & CO4 | Carry out experiments to evaluate effect of physical and chemical factors on microbial growth. |
| CH 1231.7 | PHYSICAL CHEMISTRY | CO1 | To understand the basic ideas of thermodynamics |
| | | CO2 | To understand the basic principles of chemical equilibrium and solutions |
| | | CO3 | To formulate scientific theories of speed of reaction and colloids that are common in life system |

SEMESTER 3

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| EN 1311.3 [| English for Career | CO1 | Acquire the necessary language skills required in the competitive job market. |
| | | CO2 | Acquire the cognitive, logical, analytical and verbal skills necessary to succeed in competitive examinations |
| | | CO3 | • Get sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English |
| | | CO4 | Become familiar with the pattern of questions usually asked in the competitive examinations |
| | | CO5 | Be able to prepare for and be successful in competitive examinations. |
| IM 1341 | ANALYTICAL BIOCHEMISTRY AND BIOPHYSICAL CHEMISTRY | CO1 | Discuss about various concepts in research methodology |
| | | CO2 | Explain the principle, working and application of different separation techniques like chromatography, electrophoresis and centrifugation. • |
| | | CO3 | Describe the principle, working and application of colorimeter and spectrophotometer |

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| | | CO4 | List out the application of information technology and statistical methods in biology |
| IM 1341 | PRACTICALS FOR CORE | | |
| IM 1371 | CELL BIOLOGY | CO2 | Recall the origin of life and history of cytology and draw the structure of cell organelles and locate its parts along with functions. |
| | | CO2 | Distinguish the structure of prokaryotic and eukaryotic cell |
| | | CO2 | Students will understand and describe the structure and basic components of prokaryotic and eukaryotic cells. |
| | | CO2 | Explain the communications of cells with other cells and to the environment. |
| | | CO4 | Compare and contrast the events of cell cycle and its regulation. |
| | | CO6 | Design the model of a cell. |
| IM 1372 | MICROBIAL GENETICS AND BIOTECHNOLOGY | CO2 | Recall the origin of life and history of cytology and draw the structure of cell organelles and locate its parts along with functions |
| | | CO2 | Distinguish the structure of prokaryotic and eukaryotic cell |
| | | CO2 | Students will understand and describe the structure and basic components of prokaryotic and eukaryotic cells. |
| | | CO2 | Explain the communications of cells with other cells and to the environment. |
| | | CO4 | Compare and contrast the events of cell cycle and its regulation |
| IM 1372 | VOCATIONAL PRACTICALS –P3 | CO3 & CO5 | Is able to perform agarose gel electrophoresis. |
| | | CO3 & CO5 | Is able to isolate antibiotic resistant bacterial population. |
| | | CO4 & CO5 | Is able to perform replica plate technique |
| | | CO3 | Is able to isolation genomic and plasmid DNA. |

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| | | CO2 | Learns to set up bacterial recombination |
| CH 1331.7 | BIO ORGANIC CHEMISTRY | | To understand the structure and stereo chemical aspects of biomolecules. |
| | | | To understand the building blocks of carbohydrate, protein and nucleic acids |

SEMESTER 4

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| EN 1411.3 | READINGS IN LITERATURE | CO1 | Understand and appreciate literary discourse. |
| | | CO2 | Look at the best pieces of literary writing critically. |
| | | CO3 | Analyze literature as a cultural and interactive phenomenon. |
| | | CO4 | Understand the use of the target language and make use of it in daily life. |
| IM 1441 | PHYSIOLOGICAL ASPECTS OF BIOCHEMISTRY AND ENZYMOLOGY | CO1 | Describe the mechanism of food digestion, hemopoiesis, hemostasis, kidney functions and respiration |
| | | CO2 | Detail on the physiological events in nephron, muscle, nerve and bone. |
| | | CO3 | Explain the classification, functions and regulation of hormones and hormonal control of reproduction |
| | | CO4 | Depict mechanism of enzyme action, enzyme kinetics and inhibition. |
| IM 1442 | QUANTITATIVE ANALYSIS OF BIOMOLECULES | | |
| IM 1471 | ENVIRONMENTAL, SOIL AND AGRICULTURAL MICROBIOLOGY | CO2 | Know about basics of Microorganisms interactions |
| | | CO3 | Gain knowledge about solid and liquid waste management |
| | | CO2 | Gain knowledge about role of microorganisms in Biogeochemical cycling |
| | | CO3 | Gain knowledge about the application of microorganisms in agriculture |

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| | | CO2 & CO3 | Understand about different plant diseases and their management |
| IM 1472 | FOOD AND DAIRY MICROBIOLOGY | CO2 | Understand the role of Microbes in food. |
| | | CO2 & CO3 | Familiarize the preservation techniques in food |
| | | CO3 & CO4 | Create awareness about spoilage of food by microbes |
| | | CO3 & CO6 | Gain acquaintance about fermented foods |
| | | CO4 & CO5 | Get the knowledge about food borne diseases and their outbreaks |
| IM 1473 | ENVIRONMENTAL AND FOOD MICROBIOLOGY TECHNIQUES | CO3, CO4 | Acquire knowledge about water quality analysis. |
| | | CO3 | Acquire knowledge about the isolation of N ₂ fixing microorganisms |
| | | CO3, CO4 | Acquire knowledge about the management different diseases of plants caused by microorganisms. |
| | | CO3, CO4 | Acquire knowledge about milk quality analysis |
| | | CO3, CO4 | Acquire knowledge about the microbiological examination of different kinds of food. |
| CH 1431.7 | BIOINORGANIC AND ELECTROCHEMISTRY | | To understand the basic ideas of electrochemistry |
| | | | To understand the bioinorganic molecules their structure and functions. |
| CH 1432.7 | COMPLEMENTARY COURSE V- CHEMISTRY LAB | | |

SEMESTER 5

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| M 1541 | MOLECULAR BIOLOGY | CO1 | Explain about the genome organization. |
| | | CO2 | Detail on gene expression and regulation of gene expression in prokaryotes |
| | | CO3 | Describe the various mutations and repair pathways in prokaryotes. |

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| M 1542 | FOOD SCIENCE | CO1 | Explain about the basic aspects of human nutrition and chemical composition of food consumed by human. |
| | | CO2 | List out the techniques of preservation of food and the common methods of adulteration. |
| | | CO3 | Enumerate food safety and management processes |
| M 1543 | Serum and Food analysis - PRACTICALS | | |
| M 1571 | FERMENTATION TECHNOLOGY | CO3 | Screen and isolate beneficial microorganisms from the environment. |
| | | CO2 | Understand about strain improvement techniques |
| | | CO2 | Understand the parts and design of fermenter |
| | | CO2 | Gain theoretical knowledge on production of microbial products. |
| | | CO2 | Gain knowledge about different techniques of fermentation product recovery |
| | | CO2 | Gain knowledge about different microorganisms important in food industry |
| M 1572 | VOCATIONAL COURSE -1X- PRACTICALS-P5-INDUSTRIAL MICROBIOLOGY | CO | The students will be able to understand screening methods for Industrial microbes. |
| | | CO2 | The students will be able to understand various techniques used in Fermentation Industries. |
| | | CO3 | The students will be able to know the Industrial production of various Products |
| M 1552 | LIFESTYLE DISEASES | CO1 | List out the common diseases caused by improper lifestyle |
| | | CO2 | Describe the methods of diagnosis of the diseases. |
| | | CO3 S | Explain the ways of treatment and management of these diseases. |
| M 1645 | PROJECT [CORE/VOCATIONAL] | | |

SEMESTER 6

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| IM 1641 | CLINICAL BIOCHEMISTRY | CO1 | Clinically assess the laboratory indicators of physiological conditions and diseases. |
| | | CO2 | Describe the basic concepts of pharmacology and mechanism of action of drugs |
| IM 1642 | METABOLISM | CO1 | Write the reactions involved in metabolism of carbohydrates, lipids, amino acids & nucleic acids |
| | | CO2 | List out the inborn errors of metabolism and the defective enzymes associated with it. |
| | | CO3 | Describe the regulatory mechanisms and bioenergetics of the metabolic pathways. |
| | | CO2 | Explain the process involved in photosynthesis |
| IM 1643 | ADVANCED BIOCHEMISTRY | CO1 | Write the principle of rDNA technology, PCR, cloning, RFLP, RAPD, AFLP and STR |
| | | CO2 | List out techniques for characterization of nanomaterials and its functionalization |
| | | CO3 | Explain nanotechnology and its applications in medicine and developing nano-biosensors. |
| | | CO4 | Describe applications of virtual techniques in life science. |
| IM 1643 | PRACTICALS- URINE ANALYSIS AND HEMATOLOGY | CO2 | |
| IM 1671 | MEDICAL MICROBIOLOGY | CO2 & CO3 | Gain the basic knowledge about infections, outbreaks and control measures. |
| | | CO2 & CO3 | Understand the pathogenicity of Gram positive bacterial pathogens. |
| | | CO2 & CO3 | Gain the basic knowledge about fungal infections. |
| | | CO2 & CO3 | Gain the basic knowledge about viral and parasitic infections |
| | | CO2 & CO3 | Gain the basic knowledge antibiotics their mode of action and antibiotic sensitivity testing |
| IM 1672 | VOCATIONAL COURSE 1X- PRACTICAL MEDICAL | CO2 & CO3 | To learn standard laboratory procedures in clinical microbiology. |

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| | MICROBIOLOGY AND IMMUNOLOGY | | |
| | | CO2 & CO3 | To understand how to handle and identify medically important bacteria. |
| | | CO2 & CO3 | To perform antimicrobial sensitivity tests. |
| | | CO2 & CO3 | Gain knowledge on various serological and immunological Techniques involved in diagnosis. |
| IM 1661 | ELECTIVE COURSE[VOCATIONAL] IMMUNOLOGY | CO2 | Understand the basics of Immunology and defense mechanisms |
| | | CO2 | Gain knowledge about immunity types and function of immunoglobulins. |
| | | CO2 | Understand about the cells and organs of immune system |
| | | CO2 | Know about the autoimmune diseases |
| | | CO3 & CO4 | Create awareness about hypersensitivity and immunodeficiency disease. |
| IM 1645 | PROJECT [CORE/ VOCATIONAL] | | |