

Scheme of B. Sc./ B.Sc. (Hons.) Microbiology

Year	Course Code	Subject Name	Theory/ Practical/Project	Total Credit	Total Marks	
					Max	Min
First year	MICRO -1T	Microbial World and Microbial Techniques	Theory	4	50	17
	MICRO -2T	Bacteriology, Virology & Protozoology	Theory	4	50	17
	MICRO -1P	LAB 1: BASIC MICROBIOLOGY	Practical	2	50	17
Second year	MICRO -3T	Cell Biology, Biochemistry and Bioinstrumentation	Theory	4	50	17
	MICRO -4T	Microbial Genetics, Molecular Biology & Genetic Engineering	Theory	4	50	17
	MICRO -2P	LAB 2: Bacterial cell, Biochemistry & Molecular Biology	Practical	2	50	17
Third year	MICRO -5T	Environmental, Agriculture, Industrial Microbiology & Biostatistics	Theory	4	50	17
	MICRO -6T	Immunology and Medical Microbiology	Theory	4	50	17
	MICRO -3P	LAB 3: Applied Microbiology	Practical	2	50	17
Total (I+II+III years)				30	450	--

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the concern University and is not mandatory.



Part A: Introduction			
Program: <i>Advance Diploma</i>		Class: B. Sc. Part - III	Year: 2024 Session: 2024-2025
1	Course Code	MICRO - 3P	
2	Course Title	Applied Microbiology	
3	Course Type	Laboratory course	
4	Pre-requisite (if any)	As per Govt. norms	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to <ul style="list-style-type: none"> • - <i>conduct experiments and evaluate results in microbial isolations from environment.</i> • - <i>demonstrate several aspects in industrial microbes and their products</i> • - <i>perform and analyze statistical models in biology</i> • - <i>understand about the immune system.</i> • - <i>perform basic diagnostic tests for pathogenic microbes</i> 	
6	Credit Value	02	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 17

PART B: Content of the Course

Total No. of Teaching Hours – 20 / Periods -30		
Group	Topics (Course contents)	No. of Period/ Hour
A	1. Isolation of Bacterial Microflora from Air by Settle Plate Technique 2. Isolation of Bacterial Microflora from Agriculture Soil, Rhizosphere, Phyllosphere, 3. Isolation of Fungi Microflora from Air by Settle Plate Technique 4. Isolation of Fungi Microflora from Agriculture Soil, Rhizosphere, Phyllosphere. 5. Isolation, Identification and preservation of any five fungal strains. 6. Isolation of rhizobium from root nodules. 7. Qualitative assaying of Microbial Enzymes- Catalase, Proteases, Cellulase, Amylase, Gelatinase. 8. Bacterial Analysis of Water- Presumptive, Confirmed and Completed test. 9. Composting of vegetable and fruit peels and using it on garden plants. 10. Demonstration of Bacterial Antagonism 11. Demonstration of fermentation. 12. Demonstration of Acetic Acid production in lab. 13. Demonstration of Wine Production from Grapes. 14. Cultivation of edible mushroom. 15. Calculation of Mean Median and Mode.	15 / 10



B	<ol style="list-style-type: none"> 1. Identification of human blood groups. 2. Perform Total Leukocyte Count of the given blood sample. 3. Perform Differential Leukocyte Count of the given blood sample. 4. Separate serum from the blood sample (demonstration). 5. Perform immune diffusion by Ouchterlony method. 6. Identify bacteria (any three of <i>E. coli</i>, <i>Salmonella</i>, <i>Pseudomonas</i>, <i>Staphylococcus</i>, <i>Bacillus</i>) using laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, TSI, nitrate reduction, urease production and catalase tests 7. Study of composition and use of important differential media for identification of bacteria: EMB Agar, McConkey agar, Mannitol salt agar, Deoxycholate citrate agar, TCBS 8. Study of bacterial flora of skin by swab method 9. Perform antibacterial sensitivity by Kirby-Bauer method 10. Determination of minimal inhibitory concentration (MIC) of an antibiotic. 11. Analysis of soil - pH, moisture content, water holding capacity, percolation, capillary action. 12. Isolation of microbes (bacteria & fungi) from soil (28°C & 45°C). 13. MBRT of milk samples and their standard plate count. 14. Microbial fermentation for the production and estimation of ethanol 	15 / 10
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Keywords *Isolation, Identification, Immunity, Disease, Diagnosis, Fermentation*

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended

5. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Company, New Delhi.
6. Patel AH. (1996). Industrial Microbiology. 1st edition. MacMillan India Limited Publishing Company Ltd. New Delhi, India.
7. Gregory P.H. Microbiology of the atmosphere. 2nd edition. Leonard Hill.
8. Agricultural Microbiology by Bhagyaraj and Rangaswami
9. Biostatistics by Veerbala Rastogi Kalyani Publication
10. Statistical Methods by S.P Gupta
11. Biostatistics by Sunder Rao.
12. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
13. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.
14. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
15. Aneja K. R., Laboratory Manual Of Microbiology And Biotechnology, Medtech; 1st edition, 2017

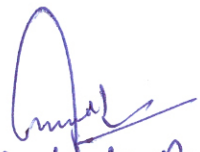
Online Resources –


<https://thebookee.net/>


<http://site.iugaza.edu.ps/mwhindi/files/Laboratory Manual And Workbook In Microbiology.pdf>

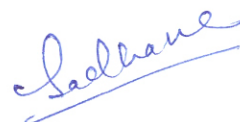
<http://site.iugaza.edu.ps/ydahdouh/files/General-Microbiology-Laboratory-pdf.pdf>


Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:	50 Marks	
Continuous Comprehensive Evaluation (CCE):	NA	
Annual /University Exam(UE):	50 Marks	
Internal Assessment:		
Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment /Field work	NA



 DR. K.K. Patel
 Govt. T.C.L. P.G.
 College Jangam



 Dr. Richa Mishra
 Member
 HOD Microbiology
 APSMNS Govt. P.G.
 College Kharwarh (C.W.)



 Dr. DK Sharma
 Member
 HOD Microbiology
 Govt. P.G. College, Patna



 Dr. Sadhana Jainwal
 Member
 HOD - Microbiology
 Govt. N.P.G. College of
 Science, Raipur



 Dr. Rashmi Parihar
 Subject expert
 Dept. of microbiology
 Govt. E.R.P.G. Science
 College, Bilaspur.


 Dr. Shubhraj Pandey
 Chancellor Nominating
 Chairperson
 HOD, Microbiology
 D.P. Vipra College
 Bilaspur (C.G.)


 Dr. Seema Anil Belorkar
 Subject Expert,
 Microbiology & Bioinformatics
 ABVV, Bilaspur.


 Dr. Swetlana Nagal
 HOD Microbiology
 Govt. M.K.G. College
 Mahasamund


 Dr. Rachana Choudhary
 H.O.D. Microbiology
 Subject Expert-1
 S.S.M.V. Junwani, Bhilai


 Prof. DSV Kulkarni
 CBOS chairperson
 HOD Microbiology
 Govt. ABVV, Bilaspur

Part A: Introduction			
Program: <i>Advance Diploma</i>		Class: B. Sc. Part - III	Year: 2024 Session: 2024-2025
1	Course Code	MICRO -5T	
2	Course Title	Environmental, Agriculture, Industrial Microbiology and Biostatistics	
3	Course Type	Core course	
4	Pre-requisite (if, any)	As per Govt. norms	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to <ul style="list-style-type: none"> - <i>describe and comprehend basic concepts of Environmental and Agriculture Microbiology</i> - <i>develop critical thinking and understanding of Environmental and Agriculture Microbiology, which will also contribute to conservation and life improvement skills.</i> - <i>learn about Microbial Interaction, Soil Microbes, Air and Water micro-flora and their impact on human life and Environment.</i> - <i>impart commercial exploitation of microbial world to improve quality of life.</i> - <i>enrich students with Systematic evaluation, presentation and interpretation of data collected and prove and process the given information</i> 	
6	Credit Value	04	
7	Total Marks	Max. Marks: 50	Min Passing Marks : 17

PART B: Content of the Course

Total No. of Teaching Hours – 40 / Periods -60		
Unit	Topics (Course contents)	No. of Period/Hour
I	Air and water Microbiology: Layers of Atmosphere and distribution of Microorganisms. Droplet nuclei and fomite infection. Methods of assessment of air quality. Aero allergy. Hydrological cycle, water zonation (fresh water and marine), Upwelling, Eutrophication, Hydrothermal vent and its microbial biodiversity, coral reef and its microbial biodiversity. Potability of water and its purification. Waste water reclamation.	12 / 08
II	Microbial Interaction: Microbe-Microbe interaction, Plant-Microbe interaction (Rhizosphere, Rhizoplane, Phyllosphere, Mycorrhiza), Animal-Microbe (Rumen Microbiology). Extremophiles. Xenobiotic compounds, Biodeterioration and Biomagnification.	12 / 08
III	Soil and Agriculture Microbiology: Soil profile, Litter degradation and Humus formation, Biogeochemical cycle- Nitrogen Cycle with special reference to microbial contribution (ammonifiers, symbiotic and non- symbiotic N- fixation, nitrifiers and denitrifiers) Nodulation and mechanism of biological nitrogen fixation. Phosphorous cycle and Phosphate Solubilizing Microorganisms, Sulphur cycle. Siderophores.	12 / 08

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IV	Industrial Microbiology: History of Industrial Microbiology, Fermenter design and Principal Types of Fermenters, Production Media and Raw Material, Scale up, Industrial Sterilization. Isolation, Screening and Strain Improvement. Types of fermentation processes-Solid State, Liquid State, Batch, fed-batch and continuous fermentation. Industrial Production of Citric Acid, Ethanol, Amylases, Penicillin, Mushroom Production, Single Cell Protein	12 / 08
V	Biostatistics: Collection, Classification, and presentation of data. Sampling, Measures of central tendency: Mean, Median, Mode. Measures of dispersion: Standard deviation and Standard Error. Concept of Probability	12 / 08
Keywords <i>Air microbiology, Water microbiology, Industrial microbiology, Biometry</i>		

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended -


1. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education.
2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition.
3. Madigan MT, Martinko JM and Parker J. (2014). Brock Biology of Microorganisms. 14th edition. Pearson Benjamin Cummings.
4. Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition, Academic Press.
5. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Company, New Delhi.
6. Patel AH. (1996). Industrial Microbiology. 1st edition. MacMillan India Limited Publishing Company Ltd. New Delhi, India.
7. Gregory P.H. Microbiology of the atmosphere. 2nd edition. Leonard Hill.
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9. Biostatistics by Veerbala Rastogi Kalyani Publication
10. Statistical Methods by S.P Gupta
11. Biostatistics by Sunder Rao.


Online Resources –


https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SMB2203.pdf
<https://microbenotes.com/microbial-interaction-and-its-types-with-examples/>
<https://microbenotes.com/category/agricultural-microbiology/>
<https://sites.google.com/site/soilagrlmicrobiol/>
<https://bookarchive.net/pdf/industrial-microbiology-by-l-e-casida-jr/>
https://www.researchgate.net/publication/280733465_A_TEXT_BOOK_OF_BIOSTATISTICS


Dr. Anand


Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:	50 Marks	
Continuous Comprehensive Evaluation (CCE):	NA	
Annual /University Exam(UE):	50 Marks	
Internal Assessment:		
Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment /Field work	NA



 Dr. Richa Mishra
 Member
 HOD Microbiology
 APSAMNS Govt. P.G.
 College Kanwartha
 (C.A.)



 Dr. Swellana Nagal
 HOD Microbiology
 Govt. MKGC Mahasamund



 Dr. K.K. Poley
 Member
 Govt. T.C. P.G. College
 Jangam

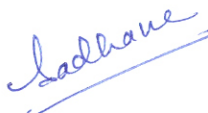

 Dr. Saubhraj Pandey
 Chancellor Nominated
 Chairperson
 HOD Microbiology
 D.P. Vipra College
 Bilaspur (C.A.)



 Dr. Rachana Chowdhary
 Subject Expert
 H.O.D. Microbiology
 Dep S.S.M.V. Jhumsar, Bhilai


 Dr. DK Simabhar
 HOD Microbiology
 Govt. P.G. Sc. College
 Dantewada


 Dr. Seema Anil Beloskar
 Subject Expert,
 MBBI, ABVV, Bilaspur


 Dr. Rashmi Parthasar
 Subject expert
 Govt. E.R.R. P.G. Science
 College, Bilaspur


 Dr. Saadhana Jainwal
 HOD - Microbiology
 Govt. N.P.G. college of Science
 Raipur


 Prof. DSV Gokuladhar
 CBOS Chairperson
 Head, Microbiology
 UTD ABVV, Bilaspur

Part A: Introduction			
Program: <i>Advance Diploma</i>		Class: B. Sc. Part - III	Year: 2024 Session: 2024-2025
1	Course Code	MICRO - 6T	
2	Course Title	Immunology and Medical Microbiology	
3	Course Type	Core course	
4	Pre-requisite (if any)	As per Govt. norms	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to <ul style="list-style-type: none"> • - <i>understand about immunological process within the human system.</i> • - <i>learn about the immune reactions and their applications</i> • - <i>understand about the mechanism of diseases and their diagnosis</i> • - <i>know about the concepts of medical microbiology and the pathogenesis</i> • - <i>understand the concepts of clinical bacteriology and clinical mycology</i> 	
6	Credit Value	04	
7	Total Marks	Max. Marks: 50	Min Passing Marks : 17

PART B: Content of the Course

Total No. of Teaching Hours - 40 / Periods -60		
Unit	Topics (Course contents)	No. of Period/Hour
I	History and development of Immunology and Immune system: Concept of Innate and adaptive immunity, Immune cells- Stem cells, T cells, B cells NK cells Macrophage, Neutrophil, Eosinophil, Basophil, Mast cell, Dendritic cell. Immune organs- Bone marrow, Thymus, Lymph node, Spleen, GALT, MALT, CALT, Antigens; Characteristics, Haptens. Antibodies; Structure, types and properties of antibodies.	12 / 08
II	Immunological Reactions: Immunological techniques: Agglutination, precipitation, Compliment fixation test, ELISA and their applications. Hypersensitivity and its types- Type I, II, III, IV and diseases mediated by them. Compliment system: Classical and alternative pathway.	12 / 08
III	Historical development in Medical Microbiology History and contribution of scientists in development of medical microbiology. Koch and River's postulates, normal microbial flora of human body and role of resident flora Pathogenesis: Host parasite relationship, Portal of entry of pathogens, De-polymerizing enzymes	12 / 08

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IV	Clinical Bacteriology: Pathogenic bacteria- morphological characteristics, epidemiology, pathogenesis, laboratory diagnosis and treatment of pathogenic bacteria; <i>Staphylococcus aureus</i> , group A <i>Streptococcus</i> , <i>Pneumococci</i> , <i>E. coli</i> , <i>Salmonella</i> , <i>Corynebacterium</i> <i>Mycobacterium</i> and drug resistance.	12 / 08
V	Clinical Mycology: Superficial subcutaneous cuteness and systemic mycosis. Morphological characteristics, epidemiology, pathogenesis, laboratory diagnosis and treatment of following pathogenic fungi; <i>Trichophyton</i> , <i>Histoplasma capsulatum</i> and <i>Candida albicans</i> .	12 / 08
Keywords	<i>Immune system, Immunological reactions, Complement system, Medical Microbiology, Pathogenesis, Clinical Bacteriology, Clinical Mycology</i>	

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended

1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.
2. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition Wiley-Blackwell Scientific Publication, Oxford.
3. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
4. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.
5. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
6. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
7. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition. Elsevier
8. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education
9. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition
10. Madigan MT, Martinko JM and Parker J. (2014). Brock Biology of Microorganisms. 14th edition. Pearson/ Benjamin Cummings

Online Resources –


https://docs.google.com/file/d/0B0lzh6GcIA_DdUxuWFhMWDNOSFE/edit?pli=1&resourcekey=0-Gxm4B8zdfp683ID7LbysmA


https://www.academia.edu/23738538/Immunology_Lecture_Notes_Immune_Responses


<https://www.libraryofbook.com/books/lecture-notes-medical-microbiology-and-infection>



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Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:	50 Marks	
Continuous Comprehensive Evaluation (CCE):	NA	
Annual /University Exam(UE):	50 Marks	
Internal Assessment:		
Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment /Field work	NA



 Dr. Richa Mishra
 member
 H.O.D microbiology
 APSAMNS
 P.G. college Khandwa
 (C.G.)



 Dr. Rachana Choudhary
 Subject Expert-
 H.O.D. Microbiology
 S.S.M.V. Junwar, Bhilai



 Dr. Dr. Shrivastava
 H.O.D
 Govt. E.R.R. PG-Sc
 college, Bilaspur



 Dr. Sadhana Jaiswal
 Member
 HOD - Microbiology
 Govt. N.P.G. college of
 Science, Raipur

 Dr. R.K. K. Patel
 Govt. T.C.I. P.G. college
 Jagn


 Dr. Sneha Nigal
 HOD - Microbio
 Govt. M.K.G. College
 Mahasamund.


 Dr. Seema Anil Belorkar
 Subject Expert
 Microbiology & Bioinform
 ABVV, Bilaspur.


 Dr. Rashmi Parihar
 Subject expert
 Dept. of microbiology
 Govt. E.R.R. PG-Science
 college, Bilaspur


 Dr. Shubhraj Pandey
 Chancellor Nominat
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 HOD, Microbiology
 D. P. Vipra College
 Bilaspur (C.G.)


 Prof DSV Anand
 Chos Chairperson
 Head Microbiology
 VTD ABVV Bilaspur