No.	Information of Subject	
1	Unit name:	Microbiology I
2	Code:	Bio T 21021
3	Classification:	Core subject
4	Credit value:	3.5
5	Semester/ Year Offered:	1/2
6	Pre-requisite:	
7	Mode of delivery:	Lectures and discussion
8	Assessment system and breakdown of marks:	Multiple choice questions, short question, short notes, long question and practical exam
	Practical	30 %
	Mid-term examination	35%
	Final examination	35%
9	Academic staff teaching unit:	Department of Biotechnology
10	Course outcome of unit: After completion of this course, students will able to 1. Generalize within multiple microbiology disciplines the core theories and practices 2. Identify the theoretical basis of the technical methods on common microbiology 3. Solve the practical skills in the use of tools, technologies and basic methods common microbiology 4. Recognize knowledge of the interaction between humans and microorganisms and introduce the fundamental characteristics of various microorganisms 5. Apply the appropriate microbiological lab equipment and methods, in order to conduct and analyze experimental measurements relevant to microbiology	
11	Synopsis of unit: The course covers the introduction to the world of microorganisms through about some of the general areas such as medicine, environmental science, food and drink production, fundamental research, agriculture, pharmaceutical industry, and genetic engineering. And then there are the understanding cells and cell membranes; differences between prokaryotes and eukaryotes. And it includes about the classification and taxonomy of prokaryotes, systematics, identification of bacteria, other methods of identification. Finally, it describes the major characteristics of the four groups of microorganisms; describes as a result of observations, the structures and reproduction; general structure and life circle of viruses including a named bacteriophage and a named retro-viruses.	
12	Topics: 1. Microbiology: What, Why and How? 2. Differences Between Prokaryotes and Eukaryotes 3. Systematics 4. Microbiology and Biotechnology	
13	Main references:	

	• **Essential Microbiology;** Second Edition, © 2013 by John Wiley & Sons, Ltd; Stuart Hogg • **BIOS INSTANT NOTE ON MICROBIOLOGY**; Fourth edition, Simon Baker, Caroline Griffiths, Jane Nicklin, © 2011 by Garland Science, Taylor & Francis Group, LLC • **Microbiological Applications**; Benson, Eighth Edition: Laboratory Manual in General Microbiology; © The McGraw-Hill Companies 2001
14	Additional references: • **Essential of Microbiology**; First Edition, 2016; Surinder Kumar, Maulana Azad Medical College, India • **PRESSCOTT, HARLEY, AND KLEIN'S MICROBIOLOGY**, 7th Edition, 2008, Joanne M. Willey, Linda M. Sherwood, Christopher J. Woolverton

Bio T 21021 Microbiology I
Course Outcomes and Indicators

No.	Course Outcomes	Indicators
1	General within multiple microbiology disciplines the core theories and practices	Excellent: Fail = 0% & A ≥ 20% Good Fail ≤ 15 % Fair Fail ≤ 25% Poor : Fail > 25%
2	Identify the theoretical basis of technical methods on common microbiology	
3	Solve the practical skills in the use of techniques and basis methods microbiology	
4	Recognize and knowledge of the interaction between humans and microorganisms and introduce the fundamental characteristics of the various microorganisms	
5	Apply the appropriate microbiological lab equipment and methods, in order to conduct and analyze experimental measurements relevant to microbiology	

Matrix of CO and PO

CO	Program Outcomes											
	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**	**12.**
a	C2											
b					C1							
c					P3							
d	C2											
e	C3								P3			

Assessment Scheme

Rubric for Class Activity

Dimension	Marks		
	2	**4**	**6**
Participation	Less participate	More participate	Participate actively

** Act in leading role will earn 4 marks extra.

Department of Biotechnology
Microbiology I (Bio T 21021)
Practical timetable (2019-2020, semester I)
Microbiology laboratory, Room- 2/ 1- 5

Sr.	Date	Title	Subtitle	Chemicals	Equipment	Remark
1	13.12.2019	Welcome to Microbiology Laboratory	-	-	- Projector - Computer	- Power Point presentation
2	27.12.2019	Microbiology Safety and Rules	-	-	- Projector - Computer	- Power Point presentation
3	10.01.2020	Introduction to Microscope	- Compound Light Microscope - Compound Light Microscope Parts & Functions	-	-Compound Light Microscope	
4	31.01.2020	Good microbiological laboratory practice (GMLP)	Resources – Equipment and use	-	- Projector - Computer	- Power Point presentation
5	14.02.2020	Good microbiological laboratory practice (GMLP)	Apparatus and Use	-	- Projector - Computer	- Power Point presentation
6	28.02.2020	Staining procedure	Gram positive and Gram negative	- Crystal violet solution - Iodine solution - Spirit - Safranin solution	- Glass slides - Pipette	- Power Point presentation

Course Specification

Bio T 21021 & 22021 Microbiology

(2019 – 2020)

Microbiology: What, Why and How? What is microbiology? Why is microbiology important? How do we know? Microbiology in perspective: to the Golden Age and beyond; Light microscopy; Electron microscopy; Differences Between Prokaryotes and Eukaryotes; Understanding cells and cell membranes; Prokaryotes; Eukaryotes; Prokaryotic systematics; Classification and taxonomy: Identification of prokaryotes; Phylogeny of prokaryotes; Identification of Bacteria; Identification from growth characteristics; Other methods of identification; Identification of pathogens; Inference of phylogeny from rRNA gene sequence; Bacterial phylogeny; The molecular clock concept; Ribosomal RNA (rRNA); Acquisition of 16S rRNA gene sequence; 16S rRNA gene bioinformatics; Kingdom Prokaryotae; Bacteria; The bacterial cell wall; Shapes of bacteria; Reproduction; Binary fission in Escherichia coli; Conjugation, transformation and transduction; Plasmids; the economic importance of bacteria; Cyanobacteria (blue-green bacteria); Structure of cyanobacteria; Nitrogen fixation; The economic importance of blue-greens; Kingdom Protoctista; The economic importance of protozoa; Kingdom fungi; Phylum Zygomycota (zygomycetes); Phylum Ascomycota (ascomycetes); Phylum Basidiomycota (basidiomycetes); Fungal spores; Viruses; Structure of viruses; Shapes of viruses; The life cycle of a virus; Viruses as disease-causing agents; Retroviruses; Laboratory safety and aseptic technique; Nutritional requirements; Culture media; Selective media; The production of sterilized nutrient media; To prepare sterile nutrient agar plates; Inoculating solid and liquid media; Growth in bacteria; Total counts; Viable counts; Constructing a growth curve; Continuous cultures; Growth in fungi; Growth curve for a filamentous fungus; Factors affecting microbial growth; Growth of bacteriophages