



# C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

BACHELOR OF SCIENCE (MICROBIOLOGY)

DEPARTMENT OF ARTS & HUMANITIES

SEMESTER: V

CODE: 4SC05PEF1

NAME: Professional Etiquettes-I

**Teaching & Evaluation Scheme:-**

Subject Code	Subject Name	Teaching Hours/week				Evaluation scheme/Semester								
		Th	Tu	Pr	Total	Theory				Practical				Total marks
						Sessional Exam		University Exam		Internal		University		
						Marks	Hrs	Marks	Hrs	Pr	TW	Pr		
4SC05PEF1	Professional Etiquettes-I	1	0	2	3	20	1	50	2	20	10	----	100	

**Objectives:**

**Prerequisites:**

**Detail Course Content:**

Unit No.	Detailed Contents
	<b>Section-A: Career Advancement Program (CAP)</b>
<b>1</b>	<b>Soft Skills</b> <ul style="list-style-type: none"> <li>• Introduction to soft skills</li> <li>• Difference between soft skills &amp; hard skills</li> <li>• Importance of soft skills</li> <li>• Intelligence quotient, Emotional quotient, Spiritual quotient</li> <li>• Classification of soft skills:</li> <li>• Thinking Skills-Self Awareness, Problem-Solving, Decision Making, Critical Thinking, Creative Thinking</li> <li>• Social Skills-Interpersonal Relationships, Effective Communication, Empathy</li> <li>• Emotional Skills-Managing Feelings/emotions, Stress Management</li> </ul>
<b>2</b>	<b>Positive Attitude</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Importance of positive attitude</li> <li>• Ways to develop positive attitude</li> <li>• External and internal factors in bulging positive attitude</li> </ul>
<b>3</b>	<b>Leadership</b> <ul style="list-style-type: none"> <li>• Who is Leader?</li> </ul>



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	<ul style="list-style-type: none"><li>• Characteristics of Leader</li><li>• Types of Leader</li><li>• Importance of Leadership in Professional life</li><li>• Case study of Swami Vivekanand Steve Jobs, Abdul Kalam, Bill Gates etc.</li></ul>
4	<b>Self Esteem</b> <ul style="list-style-type: none"><li>• Definition</li><li>• Theory of Maslow</li><li>• Advantages of High Self Esteem</li><li>• High Self Esteem vs. Low Self Esteem</li><li>• Causes of Low Self Esteem</li><li>• How to Improve Self Esteem</li></ul>
5	<b>Goal Setting</b> <ul style="list-style-type: none"><li>• Introduction</li><li>• Importance</li><li>• 5 D's of Goal Setting: Direction, Dedication, Determination, Discipline, Deadline</li><li>• Steps of Goal</li><li>• Action Plan</li></ul>
6	<b>Notice, Agendas of Meeting, Minutes of Meeting</b> <ul style="list-style-type: none"><li>• Preparing notice</li><li>• Preparing a list of agendas for meeting</li><li>• Drafting minutes of conducted meeting</li></ul>
7	<b>Meeting</b> <ul style="list-style-type: none"><li>• Introduction</li><li>• Participation in meeting</li><li>• Key features</li><li>• Etiquettes</li></ul>
	<b>Section-B: Literature</b>
8	<b>Wings of Fire by Abdul Kalam-Orientation &amp; Creation chapters</b>



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### Resources:

<b>Sr No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
1	Effective Personal Communication Skills for Public Relations	Green Andy	Kogan age Limited
2	Effective Technical Communication	M Ashraf Rizvi	Tata Mc Graw hill
3	Personality Development and Soft Skills	Mitra Barun	OUP
4	Resumes and Interviews	M Ashraf Rizvi	Tata Mc Graw hill
5	Managing Soft Skills for Personality Development	B.N. Ghosh	Tata Mc Graw hill
6	You Can Win	Shiv Khera	
7	The Monk Who Sold His Ferrari	Robin Sharma	Harper Collins
8	Wings of Fire	Abdul Kalam	University Presss



# C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

BACHELOR OF SCIENCE (MICROBIOLOGY)

DEPARTMENT OF MICROBIOLOGY

SEMESTER: V

CODE: 4SC05BME1

NAME: Bio-molecular engineering

Subject Code	Subject Name	Teaching Hours/week				Evaluation scheme/Semester							
						Theory				Practical			
		Th	Tu	Pr	Total	Sessional Exam		University Exam		Internal		University	
						Marks	Hrs	Marks	Hrs	Pr	TW	Pr	
4SC05BME1	Biomolecular engineering	3	0	0	3	30	1	70	3	----	----	----	100

**Objectives:**

**Prerequisites:**

**Course outline:**

Sr. No.	Course contents	Teaching Hours
1	Microorganisms as a tool in genetic engineering, Isolation and characterization of particular DNfragments Vectors- Plasmids, bacteriophages (lytic and lysogenic phages) Single stranded DNA phages,	10
2	Genetic engineering and its application Joining of DNA molecules, insertion of a particular DNA molecule in to a vector, Detection of recombinant molecules Screening for particular recombinants Applications of genetic engineering, commercial possibilities, uses in research, production and application of eukaryotic proteins.	10
3	<b>Nanobiotechnology</b> Nanoscale systems, nanoparticles, nanowires, thin films and multilayers; Properties of nanomaterials. Synthesis of nanostuctures - physical, chemical and biological, microbiological methods - a. Biomolecules as nanostructures. b. Nanoparticular carrier systems, Micro and Nanofluidics. c. Applications: Biosensors, drug and gene delivery systems, chip technologies,	10



## C. U. SHAH UNIVERSITY

nano imaging, Nanomedicine and Cancer diagnostics and treatment.	
<b>Total Hours</b>	<b>30</b>

### **Learning Outcomes:-**

### **Teaching & Learning Methodology:-**

### **Books Recommended:**

1. Bacterial and Bacteriophage Genetics 4<sup>th</sup> Edition by Brige.
2. DNA Repair and Mutagenesis by Errol Friedberg. 1995.
3. Gene VIII by Benjamin Lewin. 2007.
4. Methods of General and Molecular Bacteriology by Philip. 1993.
5. Microbial Genetics by Freifelder- 4<sup>th</sup> Edition.
6. Microbial Genetics by Maloy. 1994.
7. Modern Microbial Genetics by Streips and Yasbin. 1991.
8. Molecular Biology of Gene- 4<sup>th</sup> Edition by Watson. 1987.
9. Molecular Genetics of Bacteria by Dale. 1994
10. Organization of Prokaryotic Genome by Robert Charlebois. 1999.

1. Nanobiotechnology by David Goodsell. John Wiley
2. Handbook of Nanostructured biomaterials and their applications in nanobiotechnology by Nalwa HS 2005. American scientific publishers
3. Nanobiotechnology by Niemeyer CM & Mirkin CA 2005 .Wiley Interscience



# C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

BACHELOR OF SCIENCE (MICROBIOLOGY)

DEPARTMENT OF MICROBIOLOGY

SEMESTER: V

CODE: 4SC05RMD1

NAME: Research Methodology

Subject Code	Subject Name	Teaching Hours/week				Evaluation scheme/Semester							
						Theory				Practical			
		Th	Tu	Pr	Total	Sessional Exam		University Exam		Internal		University	
						Marks	Hrs	Marks	Hrs	Pr	TW	Pr	
4SC05RMD1	Research Methodology	2	0	0	2	30	1	70	3	----	----	----	100

**Objectives:**

- At the end of this course, the students should be able to:
- Understand some basic concepts of research and its methodologies
- Identify appropriate research topics
- Select and define appropriate research problem and parameters
- Prepare a project proposal(to undertake a project)
- Organize and conduct research(advanced project) in a more appropriate manner

**Prerequisites:**

Successful completion of Semester IV.

**Course outline:**

Sr. No.	Course contents	Teaching Hours
1	RESEARCH METHODOLOGY Meaning of research - Objectives of research - motivation of research - Types, approaches and significance - Methods versus methodology - Research in scientific methods - Research process - Criteria for good research - Problem encountered by research in India - Funding agencies.	10
2	RESEARCH DESIGN Research Problem: Selecting the problem - Necessity of defining the problem -Techniques involved in defining the problem - Research design - Needs and features	10



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	of good design - Different research design - Basic principles of experimental designs.	
3	DATA COLLECTION AND DOCUMENTATION Data collection methods - Data types - Processing and presentation of data - Techniques of ordering data - Meaning of primary and secondary data - The uses of computers in research - The library and internet - Uses of search engines - virtual libraries - common software for documentation and presentation	10
<b>Total Hours</b>		<b>30</b>

### **Learning Outcomes:-**

The aim of the course is to provide students with in-depth knowledge of different research methods, with an overview of different data collection procedures. A further aim of the course is to provide students with increased knowledge of the interpretation, critical review and assessment of research publications and with insight into the processes that lead to the publishing of research.

### **Teaching & Learning Methodology:-**

The teaching methods will comprise of theory lectures as prescribed.

### **Books Recommended:**

1. Research Methodology, Methods and Techniques - C.R. Kothari - Wishwa Prakasam Publications, II Edition.
2. Research: An introduction - Robert Ross - Harper and Row Publications.
3. Research methodology - P. Saravanavel - Kitlab Mahal, Sixth Edition.
4. A Hand book of Methodology of Research - Rajammal P.A. Devadass - Vidyalaya Press
5. Introduction to Computers - N. Subramanian
6. Research Methodology Methods and Statistical Techniques - Santosh Gupta.
7. Scientific social surveys and research - P. Young - Asia Publishers, Bombay.



# C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

BACHELOR OF SCIENCE (MICROBIOLOGY)

DEPARTMENT OF MICROBIOLOGY

SEMESTER: V

CODE: 4SC05ICM1

NAME: Immunology & Clinical microbiology

Subject Code	Subject Name	Teaching Hours/week				Evaluation scheme/Semester							
						Theory				Practical			
		Th	Tu	Pr	Total	Sessional Exam		University Exam		Internal		University	
						Marks	Hrs	Marks	Hrs	Pr	TW	Pr	
4SC05ICM1	Immunology & Clinical microbiology	6	0	4	10	30	1	70	3	30	--	70	200

**Objectives:**

**Prerequisites:**

**Course outline:**

Sr. No.	Course contents	Teaching Hours
1	The overview of immune system 1.1 The historical perspective 1.2 Types of immunity : Natural, Acquired, herd, Innate, specific 1.3 Cells and organs of immune system : An overview 1.4 Hematopoiesis 1.5 Primary response and generation of memory	15
2	Antigen and Antibody: 2.1 Antigen <ul style="list-style-type: none"> <li>a. Immunogenicity versus antigenicity</li> <li>b. Factors influencing Immunogenicity</li> <li>c. Adjuvant, Epitopes and Haptens.</li> <li>d. Antigen processing and presentation</li> </ul> 2.2 Antibody <ul style="list-style-type: none"> <li>a. Basic structure of Antibody</li> </ul>	15



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	<p>b. Immunoglobulin classes and their Biological activities.</p> <p>Epitopes and Receptors on immunoglobulin molecule</p> <p>Antibody Diversity and Clonal Selection Theory</p> <p>Overview of Monoclonal Antibody</p> <p>2.3 Strength of antigen – antibody reaction: Antibody affinity and avidity</p>	
3	<p>Host immune response</p> <p>3.1 Complement fixation pathway : Primary and alternative pathway</p> <p>3.2 B-cell response</p> <p>3.3 T-cell response</p> <p>3.4 Inflammation</p> <p>3.5 Chemokines</p>	15
4	<p>Dysfunctional immunity :</p> <p>3.1 Immunodeficiency Diseases</p> <p>3.2 Hypersensitivity</p> <p>3.3 Autoimmune diseases</p> <p>Overview of Transplantation immunity</p>	15
5	<p><b>Serology</b></p> <p>A) <i>In vitro</i> antigen: antibody reaction</p> <p>a. Precipitation (in fluid and gel, immunoelectrophoresis)</p> <p>b. Agglutination (Haemagglutination, Bacterial Agglutination, Passive Agglutination and agglutination inhibition)</p> <p>c. Radioimmunoassay</p> <p>d. ELISA</p> <p>e. Western Blot</p> <p>f. Immunofluorescence</p>	15
6	<p><b>Clinical microbiology:</b></p> <p>Setup of clinical microbiological laboratory.</p> <p>Collection, transport &amp; examination of specimen (Urine, Urogenital, sputum, throat, nose, mouth, pus, CSF, feces, blood).</p> <p>Disposal of specimen.</p>	15
<b>Total Hours</b>		<b>90</b>

**Learning Outcomes:-**

**Teaching & Learning Methodology:-**

**Books Recommended:**



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1. Immunology – 5<sup>th</sup> edition – J.Kuby, R. A. Goldsby , T.J.Kindt , B.A. Osborne – W.H. Freeman and Company , New York
2. Principles of Microbiology- 2<sup>nd</sup> edition – R.M.Atlas – Wm.C.Brown Publishers
3. Microbiology – 5<sup>th</sup> edition – Prescott , Harley , Klein – McGraw-Hill Publishers
4. Instant Notes in Microbiology – P.M. Lyolyard , A. Whelan, M.W. Fanger



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DEPARTMENT OF MICROBIOLOGY

SEMESTER: V

CODE: 4SC05ICM1

NAME: Immunology & Clinical microbiology (Practicals)

S.No	Experiment
1	Physical, chemical and microscopic analysis of urine.
2	Examination of throat & mouth specimen.
3	Isolation & identification of organisms from clinical samples (Gram positive)
4	Isolation & identification of organisms from clinical samples (Gram negative)
5	Isolation & identification of organisms from clinical samples (Fungi)
6	Blood grouping (slide method)
7	Blood grouping (tube method)
8	Widal test.
9	RPR test
10	Pregnancy test
11	ELISA (Demonstration)
12	Compatibility test by cross matching
13	Serum urea estimation by Barfoed method (Demonstration).
14	Blood sugar by Folin Wu
15	Blood urea Berthelot method
16	Blood/urine creatinine by Jaffes method.



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DEPARTMENT OF MICROBIOLOGY

SEMESTER: V

CODE: 4SC05MLT1

NAME: MEDICAL LABORATORY TECHNIQUES

**Teaching & Evaluation Scheme:-**

Subject Code	Subject Name	Teaching Hours/week					Evaluation scheme/Semester							
							Theory				Practical			
		Th	Tu	Pr	Total	Sessional Exam		University Exam		Internal		University		
						Marks	Hrs	Marks	Hrs	Pr	TW	Pr		
4SC05MLT1	Medical Laboratory techniques	4	0	4	8	30	1	70	3	30	--	70	200	

**Objectives:**

The course aims to give a brief idea of the various medical laboratory techniques used. It shall be useful to students who aspire to do set up laboratory.

**Prerequisites:**

Basic knowledge of biochemical processes is required.

**Course content:**

Sr. No.	Course contents	Teaching Hours
1	Clinical laboratory: Basic principles and procedures: Study of various types of laboratories, Laboratory safety, first aid measures, waste management & medicolegal problems. Preparation of solutions and reagents: Preparation of reagents, reagent grade water, normal solutions, molar solutions, percent solutions, Buffer solutions & diagnostic kits.	10
2	Instruments & laboratory techniques: Study of the following: Centrifuge, Hot air oven, incubator, colorimetry, photometry, turbidimetry, nephelometry, Flame photometry, electrophoresis, flow cytometry.	10
3	Total quality management: Definition, Quality assessment parameters, Quality control, internal quality control, QC charts, Six sigma process, Five “Q” framework,	10



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	Accreditation and certification, ISO standards, QCI, NABH, NABL & CLSI.	
4	Histopathology techniques: Introduction, laboratory requirements, study of instruments used, histopathological study of tissues, fixation, types of fixatives, decalcification, tissue embedding process, general staining procedures, Immunohistochemistry.	10
5	Hematology: Hematopoietic system of the body, Erythropoiesis, leukopoiesis. Routine hematological test, CBC, hemogram. Study of hematological diseases: Anemia, Thalassemia, Leukemia.	10
6	Immunohematology, Blood banking techniques: Study of human blood group systems, rhesus factor. Blood transfusion: QC in blood bank procedures, phlebotomy, blood processing tests, blood preservation. Selection of blood components, use of blood derivatives, techniques used for separation of blood constituents.	10
<b>Total Hours</b>		<b>60</b>

### Learning Outcomes:-

### Teaching & Learning Methodology:-

- Use of audiovisual aids.
- Use of charts.
- Student interaction, group discussion, seminar, quizzes, assignment, brain storming session.

### Books Recommended:

1. Textbook of Medical Laboratory Technology, clinical laboratory science & molecular diagnosis, Praful B Godkar & Darshan P Godkar, Vol 1 & 2, Third edition, Bhalani Publishing House, Mumbai.
2. A manual of medical laboratory technology, Anand V Naigaonkar & Dr. M.D.Burande, Nirali prakashan.



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DEPARTMENT OF MICROBIOLOGY

SEMESTER: V

CODE: 4SC05MLT1

NAME: MEDICAL LABORATORY TECHNIQUES-PRACTICALS

<b>Sr. No</b>	<b>Name of the experiment</b>
1	Preparation of 1N Sodium carbonate, 1N hydrochloric acid, 1N Sodium hydroxide, 2/3 N Sulphuric acid, 10g/dl sodium tungstate, normal saline.
2	Preparation of Benedicts qualitative reagent & confirmation of its quality by a) Separation of plasma from anticoagulated blood b) Separation of serum from clotted blood.
3	Determination of unknown concentration of colored solution by photometric method.
4	Preparation of Levey-Jenning chart.
5	Study of Westgard rule for internal quality control.
6	Determination of sigma performance of a method.
7	Determination of blood hemoglobin by Sahli method.
8	Total RBC, WBC & Differential WBC count.
9	Determination of ESR (Wintrob's method)
10	Determination of bleeding & clotting time.
11	Examination & fixation of specimen.
12	Tissue processing-manual method.
13	Use of microtome & section cutting of paraffin wax embedded tissue
14	Staining of fixed tissue by using hematoxylin & eosin staining method.