



Botany and Microbiology Department

Study curriculum: Microbiology Program

The total credit hours for the Bachelor of Science- Microbiology Program.

	Number of Courses	Credit Hours	Percentage
Common first year requirements	10	32	23.9
University requirements	4	8	6
Program requirements	Variable	78/96	70.1
Total		136	100 %

Number of Courses and Credit Hour Percentages for the Microbiology Program

	Number of Courses	Total Credit Hours	Theoretical Hours	Percentage of 134 Hours	Practical Hours
Mandatory within the specialization	66	33	24.63	33	24.63
Mandatory outside the specialization	9	7	5.22	3	2.24
Elective within the specialization	12	6	4.48	6	4.48
Elective outside the specialization	6	4	2.99	2	1.5
Total	93	50	37.31	44	32.84



Number of Courses and Credit Hours

University Requirements			
		Course Code & Number	Credit Hours
1	University Requirement (Course List)	4 Courses	8
Total		4 Courses	8

Mandatory Outside Specialization			
	Course Code & Number	Course Name	Credit Hours
1	101 BIOCH	General Biochemistry	4
2	220 BIOCH	Blood Biochemistry	3
3	121 FSN	Food Microbiology	3
Total		3	10

Mandatory Within Specialization			
	Course Code & Number	Course Name	Credit Hours
1	140 MBIO	General Microbiology	3
2	240 MBIO	Laboratory Skills	2
3	222 MBIO	Microbial fine Structure	2
4	250 MBIO	General Virology	3
5	260 MBIO	General Bacteriology	3
6	270 MBIO	General Mycology	3
7	280 MBIO	Biology of microalgae	2
8	320 MBIO	Microbial Diagnosis	2
9	331 MBIO	Microbial Physiology	3
10	334 MBIO	Biochemical Instrumentation Techniques	2
11	340 MBIO	Microbial Environment and Pollution	3
12	344 MBIO	Sanitation water Microbiology	2
13	351 MBIO	Microbial Genetics	3
14	450 MBIO	Medical Virology	3
15	451 MBIO	Immunology	3
16	460 MBIO	Medical Bacteriology	3
17	463 MBIO	Antibiotics	3
18	465 MBIO	Industrial Microbiology	2
19	470 MBIO	Medical Mycology	3
20	490 MBIO	Scientific Communication	1
21	492 MBIO	Training in Food microbes, Environmental, and Human Health	6
22	493 MBIO	Training in medical Microbiology Laboratories	6
Total		22	66

Electives Within Specialization			
	Credit Hours	Course Code & Number	Course Name
1	12	6 Elective Courses	Electives (Course List)

Electives Outside Specialization			
	Course Code & Number	Course Name	Credit Hours
1	2-4 Elective Courses	Electives (Course List)	9

Free Electives			
	Course Code & Number	Course Name	Credit Hours
1	One Free Course from Any Other Major or College		2

Microbiology Program		
	Number of Courses	Credit Hours
Common Year	10	32
University Requirements	4	8
Mandatory Within Specialization	23	66
Mandatory Outside Specialization	3	10
Electives Within Specialization	6	12
Electives Outside Specialization	2-4	9
Total	48-50	137
Service Courses for Departments of College	2	6



Study curriculum for Microbiology Program

First (Common Year)				
Course Code	Course Name	Prerequisite	Co-requisite	Credit Hours
100 ENGS	English Language	-	-	6
100 ARAB	Writing Skills (C)	-	-	2
101 CT	Computer Skills	-	-	3
101 ENT	Entrepreneurship	-	-	1
101 MATH	Calculus	-	-	3
Total Credit Hours				15

Second (Common Year)				
Course Code	Course Name	Prerequisite	Co-requisite	Credit Hours
101 STATS	Introduction to Probability and Statistics	-	-	3
101 EPH	Fitness and Health Culture	-	-	1
101 CHEM	General Chemistry (1)	-	-	4
101 CI	University Skills	-	-	3
110 ENGS	Specialized English	-	100 ENGS	6
Total Credit Hours				17

Third				
Course Code	Course Name	Prerequisite	Co-requisite	Credit Hours
101 BIOCH	General Biochemistry	-	-	4 (2+0+3)
140 MBIO	General Microbiology	-	-	3 (2+0+2)
220 BIOCH	Blood Biochemistry	-	-	3 (2+0+2)
240 MBIO	Laboratory Skills	-	140 MBIO	2 (4+0+0)
Elective Course from University Requirements		-	-	2
Elective Course Outside Specialization		-	-	3
Total Credit Hours				17

Fourth				
Course Code	Course Name	Prerequisite	Co-requisite	Credit Hours
222 MBIO	Microbial Fine Structure	-	140 MBIO	2 (2+0+1)
250 MBIO	General Virology	-	-	3 (2+0+2)
260 MBIO	General Bacteriology	-	-	3 (2+0+2)
270 MBIO	General Mycology	-	-	3 (2+0+2)
280 MBIO	Biology of Microalgae	-	-	2 (2+0+1)
Elective Course from University Requirements		-	-	2
Elective Course Outside Specialization		-	-	3
Total Credit Hours				18



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Fifth				
Course Code	Course Name	Prerequisite	Co-requisite	Credit Hours
320 MBIO	Microbial Diagnosis	-	140 MBIO	2 (1+0+2)
321 FSN	Food Microbiology	270 MBIO	260 MBIO	3 (2+0+2)
331 MBIO	Microbial Physiology	-	140 MBIO	3 (2+0+2)
340 MBIO	Microbial Ecology and Pollution	-	140 MBIO	3 (2+0+2)
Elective Course from University Requirements		-	-	2
Elective Course within the Specialization		-	140 MBIO	2 (1+0+2)
Elective Course within the Specialization		-	140 MBIO	2 (1+0+2)
Total Credit Hours				17

Sixth				
Course Code	Course Name	Prerequisite	Co-requisite	Credit Hours
334 MBIO	Biochemical Instrumentation Techniques	-	140 MBIO	2 (1+0+2)
344 MBIO	Sanitation and water Microbiology	-	340 MBIO	2 (1+0+2)
351 MBIO	Microbial Genetics	-	140 MBIO	3 (2+0+2)
463 MBIO	Antibiotics	260 MBIO	140 MBIO	3 (2+0+2)
465 MBIO	Industrial Microbiology	321 FSN	280 MBIO	2 (1+0+2)
Elective Course from University Requirements		-	-	2
Elective Course within the Specialization		-	140 MBIO	2 (1+0+2)
Free Course from Any Program or College		-	-	2
Total Credit Hours				18

Seventh (Summer)			
Course Code	Course Name	Prerequisite	Credit Hours
492 MBIO	Training in techniques of Food microbes, Environmental, and Human Health	90 Hours	6 (0+0+12)
Total Credit Hours			6

Eighth				
Course Code	Course Name	Prerequisite	Co-requisite	Credit Hours
450 MBIO	Medical Virology	-	250 MBIO	3 (2+0+2)
451 MBIO	Immunology	-	351 MBIO	3 (2+0+2)
460 MBIO	Medical Bacteriology	-	260 MBIO	3 (2+0+2)
470 MBIO	Medical Mycology	-	270 MBIO	3 (2+0+2)
490 MBIO	Scientific Communication	-	90 Hours	1 (1+0+0)
499 MBIO	Research Project	-	90 Hours	3 (0+0+6)
Elective Course within the Specialization		-	140 MBIO	2 (1+0+2)
Total Credit Hours				18

Ninth				
Course Code	Course Name	Prerequisite	Co-requisite	Credit Hours
493 MBI O	Training in medical Microbiology laboratories	460 MBIO	450 MBIO	6 (0+0+12)
Elective Course within the Specialization		-	-	2 (1+0+2)
Elective Course within the Specialization		-	-	2 (1+0+2)
Total Credit Hours				10

University Requirements (Students choose 8 Credit Hours)				
Course Code	Course Name	Credit Hours (Theory + Practical + Lab)	Prerequisite	Co-requisite
100 IC	Studies in the Prophetic Biography	2 (2+0+0)	-	-
100 Quran	Quran Kareem	2 (2+0+0)	-	-
101 IC	Principles of Islamic Culture	2 (2+0+0)	-	-
102 IC	The Family in Islam	2 (2+0+0)	-	-
103 IC	The Islamic Economic System	2 (2+0+0)	-	-
104 IC	Islamic Political System	2 (2+0+0)	-	-
105 IC	Human Rights	2 (2+0+0)	-	-
106 IC	Medical Jurisprudence	2 (2+0+0)	-	-
107 IC	Professional Ethics	2 (2+0+0)	-	-
108 IC	current Issues	2 (2+0+0)	-	-
109 IC	Development Role of Women	2 (2+0+0)	-	-
Total		22		

Free Requirement		
Course Code	Course Name	Credit Hours
Free Courses	Course from Any Other Major or College	2
Total		2

Elective Requirements Outside the Major (Students choose 6 Credit Hours)				
Course Code	Course Name	Credit Hours (Theory + Practical + Lab)	Co-requisite	Department
102 BOT	Botany	3 (2+0+2)	-	Botany and Microbiology
103 ZOOL	Principles of General Zoology	3 (2+0+2)	-	Zoology
253 CHEM	Principles of Analytical Chemistry	2 (1+0+2)	101 CHEM	Chemistry
209 PHYS	Biophysics	3 (2+0+0)	-	Physics
212 ZOOL	Parasitology	3 (2+0+2)	103 ZOOL	Zoology
262 ZOOL	Micro techniques	2 (1+0+2)	103 ZOOL	Zoology
346 BOT	Pollution and Environmental Protection	2 (1+0+2)	-	Botany and Microbiology
Total				18

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Elective Requirements Within the Major (Students choose 12 Credit Hours)				
Course Code	Course Name	Prerequisite	Co-requisite	Credit Hours (Theory + Practical + Lab)
251 MBIO	Molecular Biology	140 MBIO	-	2 (1+0+2)
335 MBIO	Biodegradation	140 MBIO	-	2 (1+0+2)
345 MBIO	Microbial Interaction	140 MBIO	-	2 (1+0+2)
346 MBIO	Mining Microbiology	140 MBIO	-	2 (1+0+2)
348 MBIO	Lichenology	140 MBIO	-	2 (1+0+2)
349 MBIO	Yeast	140 MBIO	-	2 (1+0+2)
466 MBIO	Introduction to Petroleum Microbiology	140 MBIO	-	2 (1+0+2)
487 MBIO	Plankton	140 MBIO	-	2 (1+0+2)
Total				16

Service Courses for College and Other Majors			
Course Code	Course Name	Credit Hours (Theory + Practical + Lab)	Beneficiary Department
140 MBIO	General Microbiology	3 (2+0+2)	College of Science (Botany Program, Chemistry, Biochemistry) - College of Computer Science - College of Agriculture
240 MBIO	Laboratory Skills	2 (0+0+4)	Botany, College of Computer Science
250 MBIO	General Virology	3 (2+0+2)	Biochemistry
260 MBIO	General Bacteriology	3 (2+0+2)	Botany Program
270 MBIO	General Mycology	3 (2+0+2)	Botany Program
280 MBIO	Microbial Diagnosis	2 (1+0+2)	Botany Program
345 MBIO	Microbial Interaction	2 (1+0+2)	Botany Program
Total		18	

Brief Description of Microbiology Program Courses

I. Required Courses Within the Major - Credit Hours (Lecture + Exercises + Laboratory)

140 MBIO: General Microbiology 3 (2+0+2)

This course introduces the fundamentals of microbiology, including a historical overview of microbiologists, particularly the contributions of Arab scientists to the field. Topics covered include the evolution of microbiology, factors influencing its development, methods for studying microorganisms, classification systems, cell chemistry, microbial structure, nutrition, microbial genetics, microbial metabolism, and the diversity of microorganisms, their habitats, growth and reproduction methods, interactions with other living organisms, antimicrobial agents, immunity, industrial microbiology, biotechnology, microorganisms in their natural environments, and microbial pollution.

240 MBIO: Laboratory Skills 2 (0+0+4)

This course covers the essential principles and techniques used in microbiology laboratories, including the transfer and isolation of microorganisms from various environments, morphological identification of microorganisms, and the impact of physical and chemical factors on microbial life and physiological activities. Laboratory activities include the production of antibiotics, the study of enzymatic activities of microorganisms, and medical microbiology.

222 MBIO: Microbial Structure 2 (1+0+2)

This course examines the final outcomes of physiological processes by analyzing various structures based on their chemical composition and functions. Structures studied include the capsule, filamentous structures, cell wall, outer membrane, cytoplasmic membrane, genetic material, chromosomes, plasmids, spores, ribosomes, and biofilms, as well as dormancy in microorganisms.

250 MBIO: General Virology 3 (2+0+2)

This course explores the general characteristics of viruses, various methods for culturing viruses, the structural and chemical composition of human and animal viruses, virus classification, viral families, and the replication cycle of human and animal viruses. It also covers methods for detecting viruses and antiviral agents.

260 MBIO: General Bacteriology 3 (2+0+2)

Students learn methods for isolating bacteria from diverse sources, obtaining pure bacterial cultures, and identification techniques, including genetic approaches. The course discusses bacterial groups, their characteristics, classification methods, and biological significance.

270 MBIO: General Mycology

This course addresses the general characteristics of fungi, including their properties, growth structures, classification methods, reproductive strategies, economic importance, and commercial applications.

280 MBIO: Biology of Microalgae 2 (1+0+2)

This course covers the divisions of microalgae, biotechnological applications of microalgae, their role in human life, cellular structure, nutrition, nitrogen fixation, growth characteristics, and algal toxins.

320 MBIO: Microbial Diagnosis 2 (1+0+2)

Students learn techniques for sample collection, transport, and preservation for microbial diagnosis. The course includes diagnosing diseases through nucleic acids and cellular genetics, methods for extracting nucleic acids from clinical samples, molecular laboratory techniques for disease diagnosis, and examples of diagnosing microbial diseases, including viral, bacterial, fungal, and parasitic infections.

331 MBIO: Microbial Physiology 3 (2+0+2)

This course emphasizes the importance of energy and its compounds, natural carbon sources in the biosphere, and the biological cycles of compounds. Students explore primary metabolic pathways as explanations for previous phenomena and secondary metabolism as a basis for understanding the roles of industrial and pathogenic microbes, along with the genetic basis of these processes.

334 MBIO: Biochemical Instrumentation Techniques 2 (1+0+2)

Students learn the fundamental principles of operating and utilizing commonly used instruments, such as various types of centrifuges, Atomic Absorption Spectrophotometry (AAS), electrophoresis, chromatography techniques (GC and HPLC), and the extraction and purification of proteins and DNA.

340 MBIO: Microbial Ecology and pollution 3 (2+0+2)

This introductory course provides a historical overview and outlines methods for studying microbial environments. It covers the identification of microorganisms, factors influencing their growth and distribution in natural environments, the role of microorganisms in their ecosystems,

their interactions in extreme environments, the impact of environmental conditions on microorganisms, and vice versa. The course also discusses nutrient cycles, plant surfaces as important habitats, microbial balance, and microbial pollution.

344 MBIO: Sanitation and water Microbiology 2 (1+0+2)

This course provides a general introduction to the role of water as an environmental medium for microorganisms. It covers the distribution of microorganisms in aquatic environments, including groundwater, springs, rivers, natural and artificial lakes, and sediments. Factors influencing the growth and distribution of microorganisms in various aquatic environments are discussed, along with the relationship between microorganisms and water pollution. The course also examines the microbial flora of wastewater, pathogenic microorganisms found in water and wastewater, methods for treating wastewater, and the role of microorganisms in water purification. Additionally, it covers methods for preparing water for drinking and other human uses and evaluates water quality for human consumption.

351 MBIO: Microbial Genetics 3 (2+0+2)

This course focuses on genetic material in microorganisms, including its structural and chemical composition, DNA replication, gene expression and the genetic code, and regulation of gene expression. It addresses methods of gene transfer (conjugation, bacterial transformation, and transduction), genetic mapping, mutations, DNA damage and repair, and the functioning of genes through genetic unions.

450 MBIO: Medical Virology 3 (2+0+2)

This course explores pathogenic viruses affecting humans and animals, laboratory diagnosis, and modern techniques for virus detection and infection pathways. It examines general characteristics of viruses, disease mechanisms, clinical features, epidemiology, immunity, treatment, vaccines, antiviral agents, and contemporary viral diseases.

451 MBIO: Immunology 3 (2+0+2)

This course covers the mechanisms of immune defense in living organisms against foreign bodies. It discusses the cells and molecules responsible for innate immune defense, differences between acquired and natural immunity, humoral and cellular immunity, and the structural and functional relationships among different types of antibodies. The course also covers antibody formation, genetic mechanisms of antibody diversity, the molecular basis of T-cell activation, the role of immune regulators in inflammation and acquired immunity, and methods for producing and applying antibodies for research, diagnosis, and treatment. It includes a molecular basis for acquired immunodeficiency diseases, hypersensitivity reactions, and autoimmune diseases.

460 MBIO: Medical Bacteriology 3 (2+0+2)

This course introduces pathogenic bacteria, bacterial toxins, and internal and external barriers. It examines the study of pathogenic bacteria affecting humans and animals, methods of infection, disease progression, pathogenic factors related to disease, diagnostic methods, treatment, and prevention.

465 MBIO: Industrial Microbiology 2 (1+0+2)

This course focuses on the physiological processes and the chemical composition and functions of various microbial structures, including capsules, filamentous structures, cell walls, outer membranes, cytoplasmic membranes, genetic material, chromosomes, plasmids, spores, ribosomes, biofilms, and dormancy in microorganisms.

463 MBIO: Antibiotics 3 (2+0+2)

This course introduces antibiotics, their discovery, and the microorganisms that produce them. It covers antibiotic groups, their physiological mechanisms of action, purification methods, correct usage in treatment, side effects, and sensitivity testing methods, including cooperation and antagonism among antibiotics.

470 MBIO: Medical Mycology 3 (2+0+2)

This course explores pathogenic fungi affecting humans and animals, including their habitats, nature of infections, identification methods in infected tissues and nutrient environments, treatment, and prevention strategies.

490 MBIO: Scientific Communication 1 (1+0+0)

This course provides an overview of advanced techniques for creating scientific posters and presenting written scientific reports. Emphasis is placed on oral communication, developing research proposals, content organization, and presentation skills. Students will enhance their scientific writing skills, learn to utilize and reference scientific sources, write research project proposals, and improve their skills in using databases and the internet for scientific research. The primary goal is to equip students with the ability to write academic scientific texts, serving as a culmination for evaluating their performance in this course.

492 MBIO: Training in Food microbes, Environmental, and Human Health 6 (0+0+12)

Students will spend time in microbiology laboratories and related fields such as water and wastewater authorities, grain silos, standards organizations, municipalities, and food security agencies. They will practice sampling techniques and diagnose microorganisms present in samples (bacteria, fungi, viruses, parasites) using both traditional and modern methods. Student

performance will be assessed based on skill, commitment, communication abilities, and familiarity with laboratory techniques, evaluated periodically by supervisors.

493 MBIO: Training in Medical Microbiology Laboratories 6 (0+0+12)

Students will work in microbiology laboratories at university hospitals, gaining hands-on experience in sampling techniques and diagnosing pathogenic microorganisms present in samples (bacteria, fungi, viruses, parasites). The course emphasizes both traditional and modern diagnostic methods used in medical laboratories. Students will be assessed on skill, commitment, communication abilities, and knowledge of laboratory practices, with evaluations conducted periodically by supervisors.

499 MBIO: Research Project 3 (0+0+6)

This course involves the use of scientific journals, information retrieval from various sources, experimental design and implementation, result analysis, and writing scientific reports.

II. Required Courses Outside the Major - Credit Hours (Lecture + Exercises + Laboratory)

101 BIOCHEM: General Biochemistry 4 (3+0+2)

This course covers cell organelles and their functions, regulated biological solutions, amino acids, peptides, proteins, enzymes and their cofactors, carbohydrates, lipids and biological membranes, nucleic acids and nucleotides, carbohydrate metabolism, lipid metabolism, amino acid metabolism, and the urea cycle, as well as biosynthesis of nucleic acids and proteins, vitamins and nutrition, and blood.

321 FSN: Food Microbiology 3 (2+0+2)

This course examines important microbial groups (bacteria, molds, yeasts) in food, factors affecting microbial activity (internal and external), signs of microbial spoilage in food, methods for controlling microorganisms in food (physical, chemical, and biological), food product microbiology, foodborne illness, and milk microbiology (contamination and starter cultures).

220 BIOCHEM: Basics of Blood Biochemistry 3 (2+0+2)

Students gain foundational knowledge about blood formation and plasma proteins, mechanisms of blood coagulation, red blood cells, metabolism within red blood cells, blood types, types of hemoglobin, functionality, iron metabolism, and its relation to certain types of anemia.

III. Elective Courses Within the Major - Credit Hours (Lecture + Exercises + Laboratory)

251 MBIO: Molecular Biology 2 (1+0+2)

This course introduces the structure of DNA, its reconstruction, transcription and translation of the genetic code, protein synthesis, the relationship between structure and function, regulation of gene expression, an introduction to gene cloning, applications of genetic engineering, chemical analysis of DNA using restriction enzymes, methods for determining DNA component structure, various techniques for studying genetic sequencing, and applications in recombinant technology and genetic engineering in microbiology.

335 MBIO: Biodegradation 2 (1+0+2)

This course covers topics such as growth associated with digestion (degradation), acclimatization, detoxification, activation, absorption, bioavailability, the impact of chemical structure on biodegradation, predictions of biodegradation products, metabolic assistance, environmental effects, bioremediation techniques for minerals and organic pollutants, and biodegradation of air pollutants.

345 MBIO: Microbial Interaction 2 (1+0+2)

This course introduces the molecular and cellular aspects of host-pathogen interactions, interactions between microorganisms and other living organisms, mutualistic relationships, nitrogen-fixing microorganisms, root fungi, lichens, their structure, properties, distribution, reproduction, and commercial uses.

346 MBIO: Mining Microbiology 2 (1+0+2)

This course examines the role of microorganisms in the degradation of natural products, the role of microorganisms in the degradation of petroleum products, and their role in extracting metals from natural sources.

348 MBIO: Lichenology 2 (1+0+2)

This course defines lichens, exploring their various forms, habitats, classification, external morphology, and internal structure. It covers natural reproduction methods and laboratory cultivation techniques. The course also examines lichen communities, their geographical distribution, the physiological relationship between the fungus and the algae that form lichens, and their economic importance and commercial applications.

349 MBIO: Yeast 2 (1+0+2)

This course delves into the fine structure of yeast, its nutritional requirements, and the factors affecting its growth. It discusses the agricultural and physiological characteristics of yeasts,

classification, diagnosis, reproduction methods, and the production and preservation of food yeast. The course also covers the use of yeasts to induce physical and chemical changes in materials, direct exploitation of yeasts as human food, and the production of single-cell protein from yeasts, highlighting their economic significance.

466 MBIO: Introduction to Petroleum Microbiology 2 (1+0+2)

This course focuses on the microbiology of oil fields, studying indigenous microbial communities in oil fields, sulfate-reducing bacteria, extremophiles, thermophilic bacteria, methane-producing bacteria, and iron- and nitrate-reducing microorganisms. It also covers biotechnological applications in oil production, hydrocarbon degradation under anaerobic conditions, marine oil slick microbiology, and metabolic indicators of anaerobic hydrocarbon degradation.

487 MBIO: Plankton 2 (1+0+2)

This course examines various aquatic systems, including phytoplankton and zooplankton, their buoyancy mechanisms, and factors influencing plankton growth. It explores interactions between plankton and other organisms, annual and seasonal changes, vertical variations, daily migrations, and the primary and secondary production of plankton, as well as their survival strategies.

Elective Courses Outside the Major - Credit Hours (Lecture + Exercises + Laboratory)

102 BOT: Botany 3 (2+0+2)

This course covers an introduction to plant cells, metabolism, anatomy (tissues, stems, leaves, roots), water relations in plants, absorption and transport systems, photosynthesis, genetics and life cycles, classification and evolution, as well as bryophytes, ferns, gymnosperms, angiosperms, flowers, fruits, and plant ecology.

103 ZOOL: Principles of General Zoology 3 (2+0+2)

This course studies the structure and functions of animal cells and cellular genetics, different types of animal tissues, the general characteristics of the animal kingdom, its classification, and the study of protozoan traits with selected examples. It covers the characteristics and classification of animal phyla from sponges to chordates, with an introduction to organ functions focusing on nutrition, digestion, metabolism, blood structure, and its functions.

253 CHEM: Principles of Analytical Chemistry 2 (1+0+2)

This course provides a brief introduction to quantitative analysis, concentration expressions, the principle of equilibrium and its applications to acid-base, complexation, precipitation, and redox reactions. It discusses solubility product and its implications, factors affecting solubility, volumetric analysis principles and calculations, and various reaction types, including titration

curves. The practical component includes the analysis of ionic compounds, common cations, and methods for detecting ions, alongside analysis of mixtures of cations and anions, and applications of titrations.

262 ZOOL: Microtechniques 2 (1+0+2)

This course introduces different chemical fixatives, their advantages and disadvantages, and the steps involved in optical microscopy techniques, including how to stain samples appropriately. It also covers electron microscopy methods such as fixation, washing, dehydration, embedding, sectioning with a microtome, and staining ultra-thin sections for examination with a transmission electron microscope to study the fine structures of cellular organelles.

209 Phys: Biophysics 3 (3+0+0)

This course covers biomechanics, properties of fluids and their relationships with biological systems, surface tension and viscosity, and methods for measuring these in living cells. It discusses fluid flow in biological systems, heat transfer in biological systems, biophysics of hearing, and sound interactions with biological systems. It also includes light and the eye, resting potential of living cells and tissues, active potentials of biological tissues and organs and their medical applications, as well as non-ionizing radiation types (radio waves, microwaves, infrared light, visible light, ultraviolet light, and laser). The course also addresses ionizing radiation, its nature, detection methods, and some medical applications.