



**COURSE OUTLINE : BIOL 112**

**D Credit – Degree Applicable**

**COURSE ID 005077**

**Cyclical Review: October 2017**

**COURSE DISCIPLINE :** BIOL

**COURSE NUMBER :** 112

**COURSE TITLE (FULL) :** Microbiology

**COURSE TITLE (SHORT) :** Microbiology

**CATALOG DESCRIPTION**

Biology 112 is a study of microorganisms (algae, bacteria, fungi, protozoa, and viruses). The course includes microbial biochemistry, genetics, cellular activities, applied uses, and the pathogenicity of these microorganisms. In the laboratory, students utilize various staining procedures and biochemical tests to identify at least one unknown microorganism.

Total Lecture Units:3.00

Total Laboratory Units: 2.00

**Total Course Units: 5.00**

Total Lecture Hours:54.00

Total Laboratory Hours: 108.00

Total Laboratory Hours To Be Arranged: 0.00

**Total Contact Hours: 162.00**

**Total Out-of-Class Hours: 108.00**

Prerequisite: CHEM 110 or CHEM 120 or equivalent and BIOL 101 or 120 or 122 or equivalent.



**ENTRY STANDARDS**

	Subject	Number	Title	Description	Include
1	CHEM	110	Elements Of General Chemistry	analyze experimental data;	Yes
2	CHEM	110	Elements Of General Chemistry	predict chemical properties;	Yes
3	CHEM	110	Elements Of General Chemistry	demonstrate proper use of laboratory equipment and chemicals.	Yes
4	CHEM	120	Fundamentals Of College Chemistry (Inorganic)	use the dimensional analysis method of problem solving	Yes
5	CHEM	120	Fundamentals Of College Chemistry (Inorganic)	evaluate scientific statements and develop an opinion as to their validity	Yes
6	CHEM	120	Fundamentals Of College Chemistry (Inorganic)	know and understand basic chemical data, rules, and laws.	Yes
7	CHEM	101	General Chemistry	utilize bonding theories to describe the chemical nature of ions and molecules	Yes
8	CHEM	101	General Chemistry	demonstrate the proper use of laboratory equipment and the ability to handle chemicals safely	Yes
9	CHEM	101	General Chemistry	describe the scientific method and apply it to the development of the science of chemistry;	Yes
10	BIOL	101	General Biology	identify the properties of lipids, carbohydrates, proteins, and nucleic acids;	Yes
11	BIOL	101	General Biology	describe the structure of prokaryotic and eukaryotic cells;	Yes
12	BIOL	101	General Biology	explain cell respiration and photosynthesis;	Yes
13	BIOL	101	General Biology	describe the processes of DNA replication, transcription, and translation;	Yes
14	BIOL	101	General Biology	explain the basic mechanisms of gene regulation in prokaryotes and eukaryotes.	Yes
15	BIOL	101	General Biology	demonstrate proper use of laboratory equipment including the microscope, spectrophotometer, and micropipettes;	Yes
16	BIOL	101	General Biology	demonstrate proficiency with data collection, analysis, and graphical representation.	Yes
17	BIOL	120	Human Anatomy	identify the basic features of cells and their organization as tissues;	Yes
18	BIOL	120	Human Anatomy	demonstrate proper use of a microscope to identify major tissue types in histological slides;	Yes
19	BIOL	120	Human Anatomy	identify all of the major structures of organ systems using models and tissue slides;	Yes



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20	BIOL	122	Introduction To Biology	describe important biological molecules as well as cellular structure and function;	Yes
21	BIOL	122	Introduction To Biology	describe the flow of information from DNA to protein, and the principles of inheritance;	Yes

**EXIT STANDARDS**

- 1 demonstrate a general understanding of the taxonomy and major characteristics of the various microorganisms
- 2 demonstrate general knowledge of the physical and chemical structure of prokaryotes Biology 112 Page 2 of 5 and eukaryotes
- 3 demonstrate an understanding of the biochemical processes of the cell, including cell respiration, DNA replication, genetic recombination, transcription, translation, and cellular transport
- 4 demonstrate an understanding of the physical and chemical methods and mechanisms used to control microbial growth
- 5 demonstrate an understanding of the disease process of various microorganisms
- 6 demonstrate proper aseptic techniques and proficiency in performing various staining procedures and biochemical tests on microorganisms

**STUDENT LEARNING OUTCOMES**

- 1 explain the biochemical processes of cellular activities and/or explain the disease process as it relates to microbial infections
- 2 demonstrate proficiency in various staining methods and/or biochemical tests used in identifying microorganisms

**COURSE CONTENT WITH INSTRUCTIONAL HOURS**

	Description	Lecture	Lab	Total Hours
1	Introduction and History of Microbiology <ul style="list-style-type: none"> <li>• The golden age of microbiology</li> <li>• 20th and 21st century microbiology</li> <li>• Diversity of microorganisms</li> <li>• Beneficial applications of microbiology</li> </ul>	1.5	0	1.5
2	Important Biological Molecules <ul style="list-style-type: none"> <li>• Inorganic compounds</li> <li>• Organic compounds</li> </ul>	1.5	0	1.5
3	Microscopic Techniques <ul style="list-style-type: none"> <li>• Microscope types and functions</li> <li>• Staining methods</li> </ul>	5.5	34.5	40
4	Comparison of Prokaryotic and Eukaryotic Cells <ul style="list-style-type: none"> <li>• Structures of prokaryotic cell</li> <li>• Structures of eukaryotic cell</li> </ul>	3	6	9



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5	<b>Microbial Metabolism</b> <ul style="list-style-type: none"> <li>• Enzymes</li> <li>• Biochemical pathways of energy production</li> <li>• Fermentation end products</li> <li>• Photosynthesis</li> </ul>	3	12	15
6	<b>Microbial Growth</b> <ul style="list-style-type: none"> <li>• Requirements for growth 6 laboratory hrs</li> <li>• Culture media</li> <li>• Phases of growth</li> <li>• Direct and indirect measurements of growth</li> </ul>	6	6	12
7	<b>Control of Microbial Growth</b> <ul style="list-style-type: none"> <li>• Physical methods of microbial control</li> <li>• Chemical methods of microbial control</li> <li>• Actions of microbial control agents</li> </ul>	3	9	12
8	<b>Microbial Genetics</b> <ul style="list-style-type: none"> <li>• DNA replication</li> <li>• Transcription and translation</li> <li>• Regulation of gene expression</li> <li>• Gene mutations</li> <li>• Transformation</li> <li>• Transduction</li> <li>• Conjugation</li> <li>• Genetic recombination</li> </ul>	6	6	12
9	<b>Recombinant DNA and Biotechnology</b> <ul style="list-style-type: none"> <li>• Restriction enzymes</li> <li>• Vectors and sources of DNA</li> <li>• Applications of genetic engineering</li> <li>• Genetically engineered products for medical therapy</li> </ul>	2	0	2
10	<b>Microbial Classification and Identification</b> <ul style="list-style-type: none"> <li>• Criteria for classifying and identifying microorganisms</li> <li>• Bergey's manual</li> <li>• Identification of unknown microorganisms</li> </ul>	1.5	7.5	9
11	<b>Bacteria</b> <ul style="list-style-type: none"> <li>• Classification of bacterial groups</li> <li>• Pathogenic bacteria and the diseases they cause</li> </ul>	3	6	9
12	<b>Fungal Diseases</b>	1	0	1
13	<b>Protozoa</b>	1	3	4



14	<b>Viruses</b> <ul style="list-style-type: none"> <li>• Classification</li> <li>• Viral structure</li> <li>• Isolation, cultivation, and identification of virus</li> <li>• Viral multiplication</li> <li>• Viruses and cancer</li> <li>• Latent and slow viral infections</li> </ul>	3	0	3
15	<b>Prions</b>	0.5	0	0.5
16	<b>Epidemiology and Principles of Disease</b> <ul style="list-style-type: none"> <li>• Normal microbiota</li> <li>• Etiology of infectious diseases</li> <li>• Classifying infectious diseases</li> <li>• Transmission of diseases</li> <li>• Nosocomial infections</li> </ul>	9	0	9
17	<b>Mechanisms of Pathogenicity</b> <ul style="list-style-type: none"> <li>• Portals of entry</li> <li>• Pathogens penetrate host defenses</li> <li>• Pathogens damage host cells</li> </ul>	2	0	2
18	<b>Antimicrobial Drugs</b> <ul style="list-style-type: none"> <li>• Action of antimicrobial drugs 6 laboratory hrs</li> <li>• Survey of commonly used antimicrobial drugs</li> <li>• Antimicrobial sensitivity</li> </ul>	1.5	18	19.5
				<b>162</b>

**OUT OF CLASS ASSIGNMENTS**

- 1 laboratory protocols (e. g. a written protocol that includes the title, purpose, materials needed, procedures, and expected results for each laboratory exercise);
- 2 unknown organism report (e.g. a written report of the data acquired from performing various tests on an organism and the identification of the organism).

**METHODS OF EVALUATION**

- 1 written exams;
- 2 laboratory practicum exams;
- 3 unknown organism report.

**METHODS OF INSTRUCTION**

- Lecture
- Laboratory
- Studio



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- Discussion
- Multimedia
- Tutorial
- Independent Study
- Collaboratory Learning
- Demonstration
- Field Activities (Trips)
- Guest Speakers
- Presentations

**TEXTBOOKS**

Title	Type	Publisher	Edition	Medium	Author	IBSN	Date
Microbiology: An Introduction	Required	Pearson	12	print	Gerard J. Tortora	9780321767387	2016