

ILLINOIS VALLEY COMMUNITY COLLEGE



COURSE OUTLINE

DIVISION: Natural Sciences Business

COURSE: BIO 1009 Microbiology

Date: September 11, 2013

Credit Hours: 4

Prerequisite(s): BIO 1001, BIO 1003, BIO 1007 or BIO 1008, THM 1206 or THM 1216

Delivery Method:

<input checked="" type="checkbox"/> Lecture	2 Contact Hours (1 contact = 1 credit hour)
<input checked="" type="checkbox"/> Seminar	1 Contact Hours (1 contact = 1 credit hour)
<input checked="" type="checkbox"/> Lab	3 Contact Hours (2 contact = 1 credit hour)
<input type="checkbox"/> Clinical	0 Contact Hours (3 contact = 1 credit hour)
<input type="checkbox"/> Online	
<input type="checkbox"/> Blended	

Offered: **Fall** **Spring** **Summer**

IAI Equivalent –*Only for Transfer Courses*-go to <http://www.itransfer.org>.

CATALOG DESCRIPTION:

An introductory study of the nature and activities of microorganisms and their effect on human affairs. Topics will include functional anatomy of prokaryotic and eukaryotic cells, microbial metabolism, microbial growth, control of microbial growth, survey of the microbial world and microorganisms and disease.

GENERAL EDUCATION GOALS ADDRESSED

[See the last page of this form for more information.]

Upon completion of the course, the student will be able:

[Choose those goals that apply to this course.]

- To apply analytical and problem solving skills to personal, social and professional issues and situations.
- To communicate orally and in writing, socially and interpersonally.
- To develop an awareness of the contributions made to civilization by the diverse cultures of the world.
- To understand and use contemporary technology effectively and to understand its impact on the individual and society.
- To work and study effectively both individually and in collaboration with others.
- To understand what it means to act ethically and responsibly as an individual in one's career and as a member of society.
- To develop and maintain a healthy lifestyle physically, mentally, and spiritually.
- To appreciate the ongoing values of learning, self-improvement, and career planning.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals.]

Upon completion of the course, the student will be able to:

1. Demonstrate an understanding of the functional anatomy of prokaryotic and eukaryotic cells.
 - 1.1 Demonstrate an understanding of the history of microbiology.
 - 1.2 Describe the characteristics of life.
 - 1.3 Distinguish between prokaryotic and eukaryotic cells by description and example.
 - 1.4 Demonstrate an understanding of taxonomic classification.
2. Demonstrate an understanding of microbial metabolism and growth.
 - 2.1 Demonstrate an understanding of catabolic and anabolic reactions within the cell.
 - 2.2 Define and describe the function of enzymes and their role in metabolism.
 - 2.3 Demonstrate an understanding of energy production including aerobic respiration, anaerobic respiration and fermentation.
 - 2.4 Demonstrate an understanding of the physical and chemical requirements that are necessary for microbial growth.
 - 2.5 Demonstrate an understanding of the phases of bacterial growth.
 - 2.6 Demonstrate an understanding of the culture media and culture techniques that are used to grow bacteria.
 - 2.7 Demonstrate an understanding of the methods used to enumerate bacterial growth.

3. Demonstrate an understanding of methods used to control microbial growth.
 - 3.1 Demonstrate an understanding of the physical methods used to control microbial growth.
 - 3.2 Demonstrate an understanding of the chemical methods used to control microbial growth.
4. Demonstrate an understanding of microbial genetics.
 - 4.1 Describe and explain the structure and function of both DNA and RNA.
 - 4.2 Describe and explain protein synthesis.
 - 4.3 Demonstrate an understanding of the regulation of gene expression.
 - 4.4 Demonstrate an understanding of the methods of genetic transfer in bacteria.
5. Demonstrate an understanding of the diversity of organisms that are included in the study of microbiology and their impact on our world.
 - 5.1 Demonstrate an understanding of the binomial system of taxonomic classification.
 - 5.2 Demonstrate an understanding of the characteristics of organisms in the Plantae, Animalia, Fungi, Protista and Monera Kingdoms.
 - 5.3 Demonstrate an understanding of basic Virology including characteristics of viruses, viral morphology, viral cultivation and viral replication.
6. Demonstrate an understanding of the interaction between microbe and host and the role this relationship plays in disease.
 - 6.1 Demonstrate an understanding of the symbiotic relationship that exists between humans and microbes.
 - 6.2 Describe and explain the portals of entry and exit used by pathogens.
 - 6.3 Demonstrate an understanding of the microbial mechanisms of pathogenicity.
 - 6.4 Demonstrate an understanding of the defense mechanisms of the host.
 - 6.5 Demonstrate an understanding of various human diseases caused by microorganisms.
7. Demonstrate an understanding of the laboratory techniques that are required in the microbiology laboratory.
 - 7.1 Demonstrate an understanding of aseptic techniques that are employed in the laboratory.
 - 7.2 Demonstrate the skills needed for culturing, staining and observing microorganisms.
 - 7.3 Demonstrate an understanding of the various biochemical tests that are used in the identification of a bacterial unknown.
 - 7.4 Demonstrate an understanding of the microbiological methods used to isolate and enumerate bacteria

COURSE TOPICS AND CONTENT REQUIREMENTS:

1. The Microbial World and You
2. Chemical Principles
3. Observing Microorganisms Through a Microscope
4. Functional Anatomy of Prokaryotic and Eukaryotic Cells
5. Microbial Metabolism
6. Microbial Growth
7. Control of Microbial Growth
8. Microbial Genetics
9. Viruses
10. Microbial Mechanisms of Pathogenicity

INSTRUCTIONAL METHODS:

1. Lecture - open to question and answer dialogue.
2. Discussion in small group seminars.
3. Laboratory experiences.
4. Visual aids - Powerpoint presentations, films, video tapes, CD- ROMS, videodiscs, overhead projectors, slides, transparencies, charts
5. Computers - internet, web sites, CD-ROM's and computer software
6. Exams and quizzes in lectures, labs and seminars
7. Supplemental reading - college library and internet

INSTRUCTIONAL MATERIALS:

- 1 Text: Microbiology: An Introduction, 11th Edition, Tortora, Funke and Case, Benjamin Cummings
2. Lab Manual: Selections from Microbiology Laboratory Exercises, Short Version, Margaret Barnett, Wm. C. Brown (Optional)
3. Laboratory Powerpoints – <http://www2.ivcc.edu/nett/>
4. Video Tapes – Information and Technology Services
 - a. Bacteria (35)
 - b. Kingdom Monera (214 E)
 - c. Protista (338 D)
 - d. Cellular Respiration (67)
 - e. The Crowded Skin (100)
 - f. Bacterial Transformation (34 D)
 - g. DNA - Protein Synthesis (120 B)
 - h. Viruses (430 N)
 - i. Viruses : The Mysterious Enemy
 - j. Body Defenses Against Disease (48 A)

5. Laboratory Equipment and Supplies – Biology Laboratory

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

1. Textbook reading – assignments
2. Supplemental readings – library or internet
3. Participation in class discussion.
4. Performing assigned lab exercises.
5. Identification of a Bacterial Unknown using Identibacter interactus (Computer Software Program)
6. Laboratory reports and tests
 - a. Some designated form or brief report or written evidence of accomplishment for each assigned laboratory exercise.
 - b. Periodic practical tests or quizzes on laboratory work.
7. Written and oral exams
 - a. Three or four major lecture exams.
 - b. Several minor tests or quizzes in lecture and seminar.
 - c. Optional oral testing or quizzes on an individual basis (particularly for make-up exams or other special cases.)

OTHER REFERENCES

1. Text: Microbiology An Introduction, 10th Edition, Tortora, Funke and Case, Benjamin Cummings
2. Journals such as:
 - a. Bioscience
 - b. Scientific American
 - c. Science
 - d. American Biology Teacher
 - e. Natural History
 - f. American Zoologist
 - g. Science Digest
3. Computerized data search facilities.
4. Reference Texts:
 - a. Black, Microbiology 3rd Edition
 - b. Ross, Introductory Microbiology 2nd Edition
 - c. O'Leary, Practical Handbook of Microbiology
 - d. Frazier, Food Microbiology 2nd Edition
 - e. Kuby, Immunology

- f. Schmidt, Foundations of Parasitology 4th Edition
- g. Kudu, Protozoology 5th Edition
- h. Bergey's Manual of Systemic Bacteriology
- i. Bergey's Manual of Determinative Bacteriology

Course Competency/Assessment Methods Matrix

Course Prefix, Number and Name	Assessment Options																																								
For each competency/outcome place an "X" below the method of assessment to be used.	Assessment of Student Learning	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment									
Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	Direct/ Indirect	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D															
1.1 Demonstrate an understanding of the history of microbiology.							X	X	X			X		X																											
1.2 Describe the characteristics of life.							X	X	X			X		X																											
1.3 Distinguish between prokaryotic and eukaryotic cells by description and example.				X		X	X	X				X		X																						X					
1.4 Demonstrate an understanding of taxonomic classification.				X		X	X	X				X		X																							X				
2.1 Demonstrate an understanding of catabolic and anabolic reactions within the cell.				X		X	X	X				X		X																								X			
2.2 Define and describe the function of enzymes and their role in metabolism.				X		X	X	X				X		X																									X		
2.3 Demonstrate an understanding of energy production including aerobic respiration, anaerobic respiration and fermentation.				X		X	X	X				X		X																										X	

