SYLLABUS: MICROBIOLOGY FOR NURSES: BIO XXX

Course Title: Microbiology for Healthcare Professionals  Instructor: John Chikwem
Course Number: BIO. 250  Office: NSB 344
Credit Hours: Four (4) semester hours  Telephone: Ext: 8153
Pre-requisites: Biology for Nurses  Email: jchikwem@lincoln.edu
Chemistry for Nurses
Class meetings: Office hours:  F: 2:00 – 4:00 pm
Lecture Hall: NSB xxx  Lab. time:  T: 2:00 – 4:50 pm
Laboratories: BIO. xxx  Instructor: J.O. Chikwem
Lab. Space: NSB xxx  jchikwem@lincoln.edu

Textbook: Microbiology: A Clinical Approach
Anthony Strelkauskas, Jennifer Strelkauskas, Danielle Moszyk-Strelkauskas
Published by: Garland Science
Materials for the laboratory will be provided by the instructor

Other materials: Note books for lectures and laboratory reports. Laboratory coats must be worn during laboratory exercises.

Course Description:
This course is designed to meet the requirements of students interested in careers in allied health and nursing.

Microbiology for Nurses is a one-semester course that emphasizes the interaction of microorganisms with humans and the diseases they cause. This will enable nursing and allied health students to understand disease-causing representatives of different groups of microorganisms and how these are transmitted and controlled. They also learn how to avoid the spread of infectious microorganisms in the hospital environment. Topics include microscopy, survey of various microbes, the immune system, food microbiology, microbial pathogens and mechanisms of disease transmission.

The course is complimented by laboratory exercises in which students acquire hands-on experience in studying various aspects of microbiological applications.

Instruction is facilitated by the use of power point, transparencies, online research and emails.

PROGRAM STUDENT LEARNING OUTCOMES:
The nursing program student learning objectives (NURSLO) are: (2, 3, 4, 6)
1. **Knowledge** – Students will apply knowledge synthesized from nursing science to evidence-based nursing care delivery.

2. **Effective thinking** – Our students will use a variety of thinking methods such as, critical thinking, conceptual thinking, implementation thinking, and innovative thinking, to make decisions, solve problems, evaluate information, create new processes, and plan strategies.

3. **Communication** – Students will demonstrate effective communication skills in therapeutic interactions, inter-professional information sharing, and scholarly dissemination.

4. **Technological Aptitude** – Students will competently use technology to access information necessary for identifying trends used in decision making, promoting quality improvement, and preserving safety, to provide patient care, collaborate with inter-professional teams, and to continuously advance the nursing profession.

5. **Lifelong learning** – Students will continue to advance their education to maintain knowledge and nursing skills necessary to provide quality patient care by engaging into systematic inquiry, investigation, and new knowledge generation.

6. **Cultural Competence** – Students will demonstrate willingness to learn about other cultures and use the information to collaborate with patients to provide nursing care that meets individuals’ cultural and religious needs.

7. **Leadership** – Students will apply knowledge of leadership theory and demonstrate leadership behaviors that complement particular situations.

8. **Ethics** – Students will apply ethical standards of nursing in all situations with respect for the law, the profession, patients, and themselves.

**CORE CURRICULUM STUDENT LEARNING OUTCOMES:**

1. Core SLO 1: Listen and effectively, communicate ideas through written, spoken and visual means. (communication)

2. Core SLO 2: Think critically via classifying, analyzing, comparing, contrasting, hypothesizing, synthesizing, extrapolating and evaluating ideas. (Critical thinking)

3. Core SLO 3: Apply information literacy/research skills to assist their systematic process of critical thought; articulating the problem; gather information from multiple sources and venues; evaluating the accuracy/thoroughness/timeliness of the collected data, and determining when/if the problem has been satisfactorily resolved. (Information Literacy/Research)

4. Core SLO 4: Compare and contrast self and others and explain their interdependence in terms of historical, social, political, economic, psychological, health, and ethical factors.

5. Core SLO 5: Demonstrate good citizenship and service to one’s community. Students also benefit when they engage in free intellectual inquiry seeking truth, understanding and appreciating self as well as a readiness to learn from and about different cultural and/or linguistic perspectives (Self & Others)

6. Core SLO 6: Apply and evaluate quantitative reasoning through the disciplines of mathematics, computational science, laboratory science, science, selected social sciences and other like-minded approaches that require precision of thought. (Quantification)

7. Core CLO 8: Demonstrate positive interpersonal skills by adhering to the principles of freedom, justice, equality, fairness, tolerance, open dialogue, and concern for the common good. (Interpersonal Skill)

**Student learner outcomes:**

Upon completion of the course, students should be able to:

1. To demonstrate the ubiquity and diversity of microorganisms in the human body and the environment.
2. To illustrate the characteristics features of microorganisms and the diseases they cause.
3. To explore mechanisms by which microorganisms cause disease.
4. To show how the human immune system counteracts infection by specific and non-specific mechanisms.
5. To explore the routes of transmission of infection in hospitals, communities and populations and the methods used to control the spread of infection.
6. To demonstrate the principles of vaccine preparation and the use of vaccines in immunization.
7. To show the reasons for, and the methods for sterilization of equipment and medical preparations from the microbiological point of view.
8. To show the antimicrobial activity of disinfectants in the context of the patient and the environment.
9. To illustrate the microbiological reasons for, and the importance of aseptic techniques in patient management.
10. To demonstrate the contribution of the microbiologist and the microbiology laboratory to the diagnosis of infection including specimen collection and the role of the nurse in carrying this out.

ATTENDANCE POLICY:
Lincoln University uses the class method of teaching, which assumes that each student has something to contribute and something to gain by attending class. It further assumes that there is much more instruction absorbed in the classroom than can be tested on examinations. Therefore, students are expected to attend all regularly scheduled class meetings and should exhibit good faith in this regard.

STUDENTS WITH DISABILITIES STATEMENT:
Lincoln University is committed to non-discrimination of students with disabilities and therefore ensures that they have equal access to higher education, programs, activities, and services in order to achieve full participation and integration into the University. In keeping with the philosophies of the mission and vision of the University, the Office of Student Support Services, through the Services for Students with Disabilities (SSD) Program, provides an array of support services and reasonable accommodations for students with special needs and/or disabilities as defined by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. The Services for Students with Disabilities Program seeks to promote awareness and a campus environment in which accommodating students with special needs and/or disabilities is natural extension of the University’s goal.

UNIVERSITY ACADEMIC INTEGRITY STATEMENT:
Students are responsible for proper conduct and integrity in all of their scholastic work. They must follow a professor's instructions when completing tests, homework, and laboratory reports, and they must ask for clarification if the instructions are not clear. In general, students should not give or receive aid when taking exams, or exceed the time limitations specified by the professor. In seeking the truth, in learning to think critically, and in preparing for a life of constructive service, honesty is imperative. Honesty in the classroom and in the preparation of papers is, therefore, expected of all students. Each student has the responsibility to submit work that is uniquely his or her own. All of this work must be
done in accordance with established principles of academic integrity.

**Course Requirements:**

a) Tests: There will be tests and quizzes covering lectures as well as textbook reading assignments, plus a mid-term and final examination. There will be four announced tests and four unannounced quizzes per semester.
b) Attendance: This is mandatory as there will be no make up quizzes. A daily official class attendance record will be maintained and become part of each student’s record.
c) Laboratory exercises: Students taking this course are also to take the laboratory class, BIO.xxx. The laboratory exercises account for 25% of the total marks awarded. Students will be required to wear protective clothing during laboratory exercises. Laboratory reports must be typed and submitted no later than seven (7) days after completion of the exercise. No laboratory make-ups will be done. No laboratory reports will be accepted from students who did not perform the exercise.
d) Assignments: There will be one assignment each before and after mid-term. No late submissions will be accepted without prior consultation and approval of the instructor.
e) There will be one group project in the laboratory. Project reports will be submitted for grading. Oral and poster presentations may be necessary.
f) Grading: The final grade shall be the average of grades earned on quizzes, tests, assignments, laboratory reports, mid-term and final examinations. The final examination is comprehensive and includes everything covered during the semester.

| Points |
|-----------------|------|
| Quizzes         | 120  |
| Tests           | 200  |
| Assignments     | 100  |
| Laboratory reports (minimum of 8) | 160  |
| Lab project     | 100  |
| Mid-term examinations | 120  |
| Final examinations | 200  |
| **Total points** | **1000.0** |

**Grading system**

- 100-94 = A
- 90-93 = A-
- 86-89 = B+
- 83-85 = B
- 80-82 = B-
- 76-79 = C+
- 75-77 = C
- 70-74 = C-
- 65-69 = D+
- 58-64 = D
- Below 58 = F

**Class Work Schedule:**
Pre-test assessment of students; Review of syllabus and course structure

PART I FOUNDATIONS

Chapter 1: What Is Microbiology and Why Does It Matter?

Chapter 2: Fundamental Chemistry for Microbiology; Quiz #1

Chapter 3: Essentials of Metabolism

Chapter 4: An Introduction to Cell Structure and Host–Pathogen Relationships; Test #1

PART II DISEASE MECHANISMS

Chapter 5: Requirements for Infection

Chapter 6: Transmission of Infection, the Compromised Host, and Epidemiology; Quiz #2

Chapter 7: Principles of Disease

Chapter 8: Emerging and Re-Emerging Infectious Diseases; Test #2

PART III CHARACTERISTICS OF DISEASE-CAUSING MICROORGANISMS

Chapter 9: The Clinical Significance of Bacterial Anatomy

Chapter 10: Bacterial Growth

Chapter 11: Microbial Genetics and Infectious Disease; Quiz #3

Chapter 12: The Structure and Infection Cycle of Viruses

Chapter 13: Viral Pathogenesis

Chapter 14: Parasitic and Fungal Infections; Mid-term Exam

PART IV HOST DEFENSE

Chapter 15: The Innate Immune Response

Chapter 16: The Adaptive Immune Response

Chapter 17: Failures of the Immune Response; Test #3

PART V CONTROL AND TREATMENT
Chapter 18: Control of Microbial Growth with Disinfectants and Antiseptics

Chapter 19: Antibiotics

Chapter 20: Antibiotic Resistance; Quiz 4

PART VI MICROBIAL INFECTIONS

Chapter 21: Infections of the Respiratory System

Chapter 22: Infections of the Digestive System

Chapter 23: Infections of the Genitourinary System; Test #4

Chapter 24: Infections of the Central Nervous System

Chapter 25: Infections of the Blood

Chapter 26: Infections of the Skin and Eyes; Test #5

PART VII THE BEST AND THE WORST; IMPORTANT ISSUES IN MICROBIOLOGY

Chapter 27: Biotechnology

Chapter 28: Bioterrorism

Laboratory work Schedule

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<tr>
<th>Week</th>
<th>Laboratory Topics</th>
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| 1    | a) Safety precautions in the laboratory.  
      | b) Care and use of the light microscope.  
      | c) Principle and use of the autoclave.  
      | d) Writing laboratory reports. |
| 2    | a) Transfer of microbial cultures (sub-culturing)  
      | b) Isolation of pure cultures (streak plate; spread plate; pour plate)  
<pre><code>  | c) Isolation of discrete colonies from mixed cultures |
</code></pre>
<p>| 3    | Cultural characteristics of microorganisms |
| 4    | a) Microscopy |
| 4    | b) Hanging drop preparation |
| 5    | a) Principles of staining bacteria |
| 5    | b) Preparation of bacterial smears |
| 5    | c) Simple staining techniques |
| 5    | d) Negative staining techniques |
| 6    | a) Gram staining |
| 6    | b) Acid fast staining |</p>
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<tr>
<th>7</th>
<th>a) Spore staining</th>
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<td>7</td>
<td>b) Capsule staining</td>
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<td>8</td>
<td>a) Cultivation of microorganisms</td>
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<td>8</td>
<td>b) Defined; Complex media</td>
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<td>8</td>
<td>c) Differential; Selective; Enriched; Enrichment media</td>
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<td>9</td>
<td>Physical factors affecting growth of microbes</td>
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<td>a) Temperature</td>
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<td>b) pH of medium</td>
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<td>9</td>
<td>c) Oxygen requirement</td>
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<td>10</td>
<td>a) Quantitation (enumeration) of viable bacterial cells</td>
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<td>10</td>
<td>b) Bacterial growth curve</td>
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<td>11</td>
<td>a) Biochemical activities of bacteria</td>
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<td>11</td>
<td>b) Carbohydrate fermentation</td>
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<td>c) IMVIC tests</td>
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<td>11</td>
<td>d) Transformation experiment</td>
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<td>12</td>
<td>a) Cultivation of molds</td>
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<td>b) Yeast morphology</td>
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<td>12</td>
<td>c) Identification of unknown fungi</td>
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<td>13</td>
<td>a) Chemical agents for the control of microbial growth</td>
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<td>13</td>
<td>b) Chemotherapeutic agents</td>
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<td>14</td>
<td>a) Microbiology of water</td>
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Note: 1. Lab oratory projects will be started in the third week of the semester.

2. Assignments will be given to students in the first week and 8th week of the semester. One of the assignments will include the identification of an unknown microorganism.