BIOL. 2125/2126 MICROBIOLOGY FOR HEALTH SCIENCES
Prerequisites: CHEM 1107/1117 Chemistry for Health Sciences or equivalent

Course Description:
Introduction to microbial world, bacteriology, virology, mycology, parasitology, and immunology. Suitable for students planning a career or interested in health sciences.

4 Credits
Lecture (2 hours) ----------- BIOL 2125.21 W & F 9:00 – 9:50 AM
Laboratory (4 hours) DH 5512 BIOL 2126.21 W & F 11:00 – 12:40 PM
BIOL 2126.22 W & F 1:00 – 2:40 PM
BIOL 2126.23 T & TH 11:30 – 1:10 PM **
BIOL 2126.24 T & TH 9:00 – 10:40 AM **

Instructor: Dr. Alice Benzecry
Office: Dickinson Hall, Room 4416
Office Hours 😊: Thursday 9:30 – 11:30AM
Or by appointment
Phone # 692-2385 / e-mail: benzecry@fdu.edu

** Lab Instructor: Mr. R. Wiltsie

Requirement:
- Lab Notebook: A small composition notebook to be used exclusively for this class.
- Lab Coat: You must obtain a lab coat. Student without lab coat will not be admitted into the laboratory.
- Students must have a FDU and a no-FDU e-mail accounts to be able to continue their education in case of an emergency. To create an FDU Webmail account, visit http://score.fdu.edu for instructions. To create a free non-FDU e-mail account, visit http://mail.yahoo.com or http://www.hotmail.com. Click on "Sign Up." The system will step you through the process of creating a new account.
Course Objective:
Microbiology for the Health Sciences is an introductory course suitable for students planning a career in the health sciences. Students are expected to have some knowledge of basic chemistry and biology (at least one unit of high school biology). Students are introduced to the microbial world with emphasis on aspects of immunology, bacteriology, virology, mycology and parasitology which are relevant to the role of microorganisms in disease processes. The Laboratory will deal with the isolation and identification of common pathogenic and nonpathogenic organisms utilizing techniques of staining, culturing, fermentation reactions and microscopic inspection.

Student Learning Outcomes:
Upon successful completion of this course, students will be able to:

a. Demonstrate their ability to integrate knowledge and ideas in a coherent and meaningful manner by taking multiple choice and essay exams.
b. Demonstrate their ability to think critically by identifying an unknown.
c. Locate and use scientific information by preparing a research paper.
d. Effectively express themselves in written and oral form by writing and presenting a research topic.
e. Demonstrate their ability in the following laboratory skills:
   1. Use of bright field microscope including recording accurately microscopic observations
   2. Properly preparing slides for microbiological examination, including performing Gram stain, Acid fast, and other differential staining techniques.
   3. Using properly aseptic techniques for the transfer and handling of microorganisms and medical samples.
   4. Using appropriate microbiological media and test systems.
   5. Working effectively independently and in teams or groups so that the task, results, and analysis are shared by individuals and within a group.

Additional information:

a. You instructor will be available to discuss any issue that may be affecting your academic performance. Feel free to e-mail or call me at any time. Do not wait until the last day of class!
b. Tutorial assistance for this course is available through the Learning Center. Copies of the text book and other materials are in reserve at the Library. Students are strongly advised to take advantage of these resources.
c. Student Counseling and Psychological Services are available to all students. Student Union Building (201) 692 2174
d. Class continuation, in case of an emergency situation where the University has to be closed, classes will continue via WebCampus, e-mail and/or other means of communication. An emergency list of students and faculty information and guidelines will be prepared and distributed to the class.
e. Student Centered Online Resource for Education (SCORE) provides technical information for all FDU systems.
f. You must contact the FDU Technical Assistance Center (UTAC) with any technical problems. UTAC can be reached at 973-443-8822 (8822 from Florham, #8822 from Metro) fdutac@fdu.edu
g. To obtain service from UTAC you will need your University ID
h. The College regulations regarding cheating and plagiarism will be strictly enforced. Tape recorders are prohibited without written permission from instructor.

Course expectations:

a. **Attendance:** Students are required to attend all lecture and laboratory sections. Lateness or absence of greater than 10% is considered excessive and could result in a lowering of your course grade.

b. **Reading assignments:** Students are expected to read all assigned chapters and/or lab exercises prior to class.

c. **Class participation:** Participation in class discussion and in all laboratory activities is expected.

d. **Uses of electronic devices.** (tape records, cell phones, camera phones, pages) are prohibited in the classroom and laboratories. Students MUST TURN their cell phones and/or pages OFF or to vibrator before entering the classroom.

e. **Use of WebCampus:** All students are expected to be familiar with WebCampus and Blackboard interface. Students must check webCampus at least once a week for course updates and instructions.

f. **Emergency course continuation.** In case of an emergency closing of the University, classes will continue via WebCampus, e-mail, telephone or other means of communication. Be prepared to follow instructions under those circumstances. Students should make all effort to have access to a working phone and/or computer in order to communicate with the instructor and their classmates.

g. **Laboratory:** Students must follow all laboratory rules and protocols
   i. No student will be permitted into laboratories wearing shorts, halter tops, open toed sandals, undershirts or any other inappropriate attire. All students must wear lab coats when attending lab.
   ii. Students must bring their lab manual and lab notebook to every class.
   iii. Missed laboratory can not be made-up. You should consult your lab partner for the information missed and results.

h. **Examinations:**
   i. Students are expected to answer multiple choice questions, filling and matching, and essay questions.
   ii. Dates of examinations are tentative except for the final exam.
   iii. You will be responsible for material covered in reading assignments and in lecture. You are also responsible for knowing the FDU policy on academic integrity and for strictly adhering to it.
   iv. **SHOW UP ON TIME.** Late comers will not be given extra time to complete their exam.
   v. Make-up examinations will be provided at the instructor’s discretion if there is a valid, documented excuse and if notification is provided within 24 hours of the schedule examination.
Grading and other methods for assessing student academic performance

- **Lecture Exams**: Three lecture exams (10% each) unless otherwise stated each lecture exam will be given during the assigned (see lecture schedule) lecture period. Exam will test your knowledge of material cover in class since the last exam. You will be expected to answer multiple choice questions as well as essay questions.
- **Lecture Final Exam**: (20%) Exam will test your knowledge of material cover in class during the entire semester. It will comprise of 100 multiple choice questions. You must take this exam in order to complete the course.
- **Research Paper**: (10%) Each student will be required to compile a quick reference list of contagious diseases.
- **Lab Mid-Term Exam**: (15%) will consist of two parts: A written part, which will include multiple choice, filling and short answer questions, and a practical portion where the student must perform specific laboratory techniques.
- **Lab Final Exam**: (10%) will include multiple choices, filling and short answer questions on material cover in the lab during the entire course
- **Lab reports and performance**: (10%) Competence in performing laboratory procedures, adherence to safety measures, and interpreting experimental results will be considered as part of your laboratory grade. Your instructor will base the evaluation on the following objectives:
  - Follow all safety rules stated in the laboratory manual.
  - Proper completion of select lab reports.
  - Demonstrate a working knowledge of the care and use of the microscope.
  - Use aseptic technique when handling cultures.
  - Demonstrate evidence of preliminary preparation (exercise outline) and organization when performing laboratory techniques.
  - Perform selected laboratory techniques safe and correctly.
  - Interpret laboratory results correctly.
  - Maintain records of all laboratory procedures, questions, explanations and experimental data obtained during lab – Lab notebook will be collected during the midterm and lab final exams.
- **Group Project**: (15%) Each group will be given a microbiology study case. Students must research background information and try to solve their case study based on laboratory test done by the group during Lab. Specific guidelines will be given to the students at the appropriated time.

YOU MUST PASS BOTH LECTURE AND LABORATORY TO PASS THE COURSE!

Final letter grade will be assigned accordant to the following grade scale.

- **A**: 94-100%, **A-**: 90-93%
- **B+**: 87-89%, **B**: 83-86%, **B-**: 80-82%
- **C+**: 77-79%, **C**: 73-76%, **C-**: 69-72%
- **D+**: 65-68%, **D**: 60-64%, **F**: ≤ 59

Any problem(s) you may have during this course should be communicated and/or discussed with the Instructor immediately, DO NOT wait until it is too late.
<table>
<thead>
<tr>
<th>Lecture Period</th>
<th>TOPICS</th>
<th>Assigned Text Reading</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction to Microbiology:</td>
<td>CHAPTERS 1 &amp; 2</td>
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</table>
| 2-3            | - Microbiology the Science, Scope of Microbiology  
                  - Historical developments and Role of Microorganisms  
                  - Specimen preparation and use of Microscope | |
| 4-5            | Cell Structure and Taxonomy:  
                  - Taxonomy :  
                  - Overview, Importance, System of classification.  
                  - Overview of cells | CHAPTERS 3, 4 & 17 |
| 6-9            | Diversity of Microorganisms and the diseases they cause  
                  - Acellular microorganisms:  
                  - Viruses, Viroids, and Prions  
                  - Cellular microorganisms  
                    - Prokaryotic cellular structures  
                      - **Domain Archaea**  
                      - **Domain Bacteria** | |
| 10             | EXAM 1 (Friday Feb.29) | |
| 11-12          | - Eucaryotic cellular structures  
                  - **Domain Eukarya** Algae and Protozoa, Fungi, and Helmenths | CHAPTERS 5 & 18 |
| 13             | The Chemistry of life:  
                  - Organic compounds - web. appendix 2  
                  - Nucleic Acid Structure – DNA / RNA, Gene Structure and Genetic Code, Prokaryotic, Protein Synthesis. | CHAPTER 6 |
| 14-16          | Microbial Physiology and Genetics:  
                  - Prokaryotic DNA Replication: Bi-directional & Rolling circle  
                  - Replication Ways in which bacteria acquires new information  
                  - Metabolism: Respiration, Fermentation, Photosynthesis, Biosynthesis | CHAPTER 7. |
| 17-18          | Controlling the Growth of Microorganisms:  
                  - **Growth** – Culture Media, Population Growth Curve  
                  - Factors influencing microbial growth  
                  - Physical and Chemical Antimicrobial Methods  
                  - Chemotherapy and bacterial resistance | CHAPTERS 8 & 9 |
<p>| 19             | EXAM 2 (Wednesday April 9) | |</p>
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Topic</th>
<th>Content</th>
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<tbody>
<tr>
<td>10</td>
<td>Interactions between Humans and Microbes</td>
<td>- Indigenous Microflora and its beneficial roles.</td>
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<td>- Symbiotic relationships – Mutualism, Commensalisms, parasitism, neutralism and antagonism.</td>
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<td>11</td>
<td>Epidemiology</td>
<td>- Epidemiologic Terminology</td>
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<td>- Interactions among pathogens, hosts and the environment.</td>
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<td>- Chain of infection</td>
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<td>- Reservoir of infection</td>
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<td>- Living reservoir</td>
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<td>- Non-living reservoir</td>
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<td>- Modes of transmission</td>
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<td>- Bioterrorist and biological warfare agents</td>
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<td>- Water supplies and swage disposal</td>
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<td>12</td>
<td>Preventing the Spread of Communicable Diseases:</td>
<td>- Nosocomial Infections</td>
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<td>- Control Measures and Control Procedures</td>
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<td>13 &amp; 14</td>
<td>Diagnosing infectious diseases:</td>
<td>- Pathogenicity and host defense mechanisms</td>
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<td>- Infections – four phases in the course of an infection</td>
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<td>- Acute, subacute, and chronic diseases</td>
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<td>- Pathogenesis of infection diseases</td>
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<td>- Virulence and virulence factors.</td>
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<td>14 &amp; 15</td>
<td>Human Defenses Against Infectious Diseases:</td>
<td>- Non-specific Mechanisms of defense – First and second line of defense</td>
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<td>15 (cont.) &amp; 16</td>
<td>Immune Response – Third line of defense</td>
<td>- Immunodiagnostic procedures</td>
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BIOL 1126  Microbiology for the Health Sciences
Laboratory DH 5512

Requirements:


- Lab Notebook Students must have a composition type notebook to be used exclusively for recording all laboratory procedures, questions, explanations and experimental data obtained during lab.

- Lab Coat Students will not be admitted into the Lab without a Lab Coat.

Students must follow laboratory rules and regulations at all times NO EXCEPTIONS.

Laboratory attendance is mandatory. Students are responsible for all information given during lab periods. Due to the nature of this course, laboratory exercises can only be performed during the assigned lab period (no make-up). If a student misses a lab, he/she must obtain the giving information from a classmate.

Before each lab period, students must read the assigned material and write an outline to be delivered to the instructor prior to the Laboratory work. During lab, all material used, procedures, results and discussions must be recorded on the lab notebook. All microscopic observation must be recorded in the form of drawings on the lab notebook. Lab notebooks are going to be collected and graded during midterm and final exam periods.

After the completion of all laboratory exercises you will be given an unknown organism, which you will have two weeks to identify it. When the time comes, you will receive specific guidelines in how to do this project.

Students without Lab manual, notebook and/or lab coat will not be admitted into the laboratory.
<table>
<thead>
<tr>
<th>LAB</th>
<th>TOPIC</th>
<th>Assigned Reading</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction Laboratory safety and Protocol.</td>
<td>Section 1</td>
</tr>
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</table>
| 2    | **Introduction** to Microscopy and Specimen preparation | Exercise 1  
Chapter 2 (text book) |
| 3    | Preparation of Oral smears and Wet Mount       | Exercises 2 & 3                        |
| 4    | **Staining Techniques:**                       | Exercise 2 cont. 
Exercises 14, 15A, 16, 17 & 18 
Sections 4 & 5 
Chapters 3 & 4 (text book) |
| 5    | Basic staining                                 |                                       |
| 6    | Differential staining: Gram, Acid Fast Stain, Capsule, flagella, and endospore staining |                                       |
| 7    | **Cultivation techniques:**                    | Section 2 – 
Chapter 8 (text book) 
Exercises 4 & 5 |
| 8    | Transfer and Colony Selection techniques;       |                                       |
|      | Isolation of pure cultures (Pour plate and Streak Plate) |                                       |
| 9    | Bacterial culture characteristics               |                                       |
| 10   | Differential and selective media Cultivation of anaerobes | Exercises 7, 8, 20 
Hand-out |
| 11   | Results and Review for Mid – Term exams         |                                       |
| 12   | Lab Mid Term Exams                             |                                       |
|      | **Thursday March 6 / Friday March 7**           |                                       |
| 13   | **Survey of the microbial world:**             | Section 3 - 
Chapter 5 (text book) 
Exercises 10, 11, 12 & 66 |
| 14   | Distribution of Microorganisms in the Environment: Protista: algae and protozoa, Fungi: Mold, Yeast, and Mushrooms, Helminthes |                                       |
| 15   | **Control of Microorganisms by Chemical and Physical factors:** | Section 7 – 
Chapter 9 (text book) 
Exercises 29A, 30, 31, 32A, 33, 34 & 37 |
| 16   | Heat, pH, Osmotic pressure, Ultraviolet Radiation, Heavy metals, Disinfectants & Antibiotics |                                       |
| 17   | **Biochemical activities**                     | Section 6 
Chapter 7 (text book) 
Exercises 21 & 22 |
| 18   | Extracellular degradation of polysaccharides, proteins, lipids, and DNA. Intracellular Metabolism: Carbohydrate metabolism |                                       |
| 19   | Nitrogen metabolisms Oxygen utilization: Oxidase and Catalase | Exercises 23 & 24 |
| 20   | Multi test Media                               |                                       |
| 21   | IMViC test, Triple Sugar Agar, Litmus milk and Enterotube®II System–. | Exercises 25, 26 & 27B |
| 22   | Results and review                             |                                       |
| 23-27| **Lab Final + Group project Unknown ID**       |                                       |
| 28   | Clean-up                                       |                                       |