

LAGUARDIA COMMUNITY COLLEGE
CITY UNIVERSITY OF NEW YORK
NATURAL SCIENCES
SCB 260: GENERAL MICROBIOLOGY
(4 credits – 3-hour lect. 3-hour lab)
Course coordinator: Olga Calderón, PhD. ocalderon@lagcc.cuny.edu
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Gen. Microbiology ePortfolio: <https://lagcc-cuny.digication.com/scb260-general-microbiology/home-1>

Office Hours: _____ or by appointment.

zoom link: – Link posted on Blackboard Info tab with dates – If unable to meet, then email me for online appointment

Our Gen. Microbiology Classes begin on January 3rd, 2022 through February 15th, 2022.

***Please note:** All classes (lab and lecture) are conducted synchronously on Blackboard Collaborate from January 3rd, 2022 through February 15th, 2022 - attendance is expected and mandatory!

- Unknown Lab Report **Due on Friday February 11th, 2022**
- Lab Exam on Thursday **February 17th, 2022**
- Lecture exam # 4 on Tuesday **February 22nd, 2022**

Class schedule for lab and lecture

Sub	Cat#	SIMS	Days	Start	End	Room	Instructors Name
SCB	260					Online-Synchronous	
SCB	260					Online-Synchronous	

COURSE DESCRIPTION

This course introduces students to microorganisms found in nature, industry and disease. Topics covered include virology, bacteriology, immunology, epidemiology, pathology and other related areas of microbial physiology. The laboratory will deal with the isolation and identification of common pathogenic and non-pathogenic organisms utilizing techniques of staining, culturing, fermentation reactions and microscopic inspection. The lab sessions will reinforce and emphasize lecture material.

PREREQUISITES

SCB202 or SCB204 or SCB209

REQUIRED TEXTS

Good news! your textbook for this class is available **for free online**, in web view and PDF format! You can also purchase a print version, if you prefer, via the campus bookstore or from OpenStax on Amazon.com.

You can use whichever formats you want. Web view is recommended -- the responsive design works seamlessly on any device. If you buy on Amazon, make sure you use the link on your book page on openstax.org so you get the official OpenStax print version. (Simple printouts sold by third parties on Amazon are not verifiable and not as high-quality.)

TEXTBOOK": MICROBIOLOGY from OpenStax, Print ISBN 1938168143, Digital ISBN 1947172239, <https://openstax.org/details/microbiology?Book%20detailshgyuj>

MICROBIOLOGY is produced through a collaborative publishing agreement between OpenStax and the American Society for Microbiology Press. The book aligns with the curriculum guidelines of the American Society for Microbiology.

LABORATORY MANUAL

Title: Microbiology Laboratory Theory & Application, **3rd Edition**
Authors: Michael J. Leboffe, Burton E. Pierce
Publisher: Morton Publishing Company Copyright: 2008, 2012, 2016

The following are necessary requirements for this **synchronous online course.**

- A computer (desktop/laptop) or mobile device (smartphone, tablet, iPad)
- Microphone, speakers, headset, or earbuds
- Stable high-speed internet connection
- Webcam
- Microsoft Office (Word, Excel, PowerPoint)

- LaGCC student email
- ePortfolio and Blackboard accounts

To be marked present all students will be required to have their videos on when I take attendance

For video tutorials on any of the mentioned and other technologies click on the links below. You can find links to frequently used technology resources as well as how to access the latest technology and software offerings -whether you are on campus or off. account, CUNYfirst, Office365, CUNY Virtual Desktop, CUNY Dropbox, etc. For video tutorials on any of the mentioned and other technologies click on the link below.

<https://www.laguardia.edu/coronavirus/student-resources/>

or

<https://www.laguardia.edu/technology-resources/>

Here is some advice for getting you through the first semester.

- **Don't memorize.** Success in this course as in life is based on understanding WHY. WHY the reactions happen and how mechanisms occur. Many of the concepts in this course will become clear after you have had a chance to analyze and review, especially in lab. Review periods are *essential*; therefore, you need to schedule regular study periods of minimum 2-3 hours per day. It is impossible for you to memorize or cram 6 or more chapters 3-days before exams.
- **Take notes and re-write them.** Write, re-write, re-write again then analyze your notes! Listening to lecture recordings while looking at PowerPoint slides only will give you a false sense about how well you understand the material; only by writing and again re-writing the notes will you truly understand the ideas and cellular processes.
- **Form study groups with your colleagues,** network! You will be amazed at how much you can help each other. And work on solving additional problems within the chapter or other textbooks for more practice. Create your own exam questions.
- **Make the most of the resources you have available,** including other textbooks, online sites, tutoring and OFFICE HOURS! Do not wait till the day before a major exam to come to me to clarify material from weeks behind, that will be too late!

Practical and useful studying strategies

- Read other textbooks
- Summarize the material as you read
- Re-write notes several times
- Create concept maps
- Form study groups
- Do homework questions at the end of chapter
- Attend tutoring
- Take practice exams
- Find online resources
- Take quizzes
- Create outlines
- Develop flash cards

****Stay focused and involved.** Microbiology is an evolving science, we can make it interesting and creative, so I invite you to forward me any interesting articles, podcast, documentaries

Lectures

The procedure is the following;

1. Before each class you need to read the corresponding sections of the textbook. As always you are not limited to the textbook
2. You will have access to Blackboard Collaborate as long as you are enrolled in this course - Be on time!
3. We will have our lecture and labs via Blackboard Collaborate conferencing.
4. All exams will be on Blackboard

GRADING CRITERIA

Lecture	60%	Laboratory	40%
Outline 1-group work BB-Discussion posting	1% 7% 2%	Pre-lab Quizzes	4%
4-Exams	40%	Morphological & Individual Unknown	4% 20%
Term Paper Project	10%	1 Lab Exam Labster Virtual Modules	3% 9%

LAGUARDIA'S COURSE GRADE RUBRIC

A	=	93 – 100	C-	=	70 – 72.9
A-	=	90 – 92.9	D+	=	67 – 69.9
B+	=	87 – 89.9	D	=	63 – 66.9
B	=	83 – 86.9	D-	=	60 – 62.9
B-	=	80 – 82.9	F	=	<59.9
C+	=	77 – 79.9			
C	=	73 – 76.9			

ATTENDANCE on-line is mandatory based on the College's policy. Both lecture and laboratory! Attendance will be taken at each session. You must e-mail your instructor the day you are absent and let him/her know the reason you are not attending class, and especially on a day that there is an exam scheduled.

EXAMINATION MAKE-UP POLICIES

LECTURE EXAMS There are four (4) major exams. If you are absent for any exam, a make-up will be permitted on your own time. Make-ups for exams will be administered only after documented absence (doctor's note, etc.). The make-up exams tend to be considerably more difficult than the scheduled exam.

LABORATORY EXAMS

If you are absent or late, there will be no make-ups permitted. However, the lowest lab exam grade will be dropped when calculating your exam-lab average. There are no make-ups for the pre-lab quizzes. Missed lab exams will be given only at the discretion of the instructor.

2 WRITING ASSIGNMENTS – Term paper (lect.) 10%

*Term paper (lect.) assignment meets the global learning competency (GL) and writing ability.

**Individual Unknown report (lab) 20% will address inquiry and problem-solving competency (IPS).

This class will be depositing student work for this semester in the e-portfolio platform. For information about how to deposit student work, go to:

Assessment resources for students: http://eportfolio.lagcc.cuny.edu/for_students.htm

1. You must deposit your term paper on the assessment section for GLOBAL LEARNING in the lecture part of the course listed on e-portfolio by the end of the semester.

2. You must deposit the individual unknown report on the assessment section for Inquiry and Problem Solving in the lecture area of the course by the end of the semester.

GROUP ASSIGNMENT- DEBATE PRESENTATION - A group video assignment (10% of your grade)

- Outline = 1% of your grade See BB Group Video Presentation TAB for more information
- Group debate video presentation = 7% of your grade – See BB Group Video Presentation TAB for more information
- BB feedback discussion board postings are worth 2%. See BB Group Video Presentation TAB for more information

LABORATORY

- Due to COVID-19 we will be doing virtual labs – labs will be based on microbiological techniques – see lab outline for weekly scheduled exercises at the end of this document.

POLICY ON CHEATING

Instructors of this course are required to implement College policy regarding cheating on examinations and quizzes. A complete statement is available through student counseling services.

A synopsis is as follows:

If an instructor suspects a student of cheating, or any of the violations listed below, the instructor will inform the student of his or her suspicion, and a student/teacher conference will be held. At that conference the suspected violation and the instructor's intended penalty for the violation will be discussed.

1. Give the student a copy of the STUDENT HANDOUT ON LAGUARDIA ACADEMIC INTEGRITY POLICY (this document) and answer any questions the student may have.
2. Inform the student of the reasons for his or her suspicions and the intended penalties. These penalties may include, but are not limited to, the following:
 - a. An "F" on the paper, quiz, assignment or examination involved
 - b. And an "F" for the course.
3. If the student admits guilt, and agrees on the penalty, he/she should indicate so on the formal complaint. The instructor will then send the complaint to the Office of Academic Standing and impose the penalty.
4. If the student does not admit guilt or agrees to the penalty, the student/teacher conference will end and a hearing on the issue must be held. The instructor will then submit the complaint to the Office of Academic Standing, which will send a copy to the Dean of Students who will then begin disciplinary proceedings.

If the records of the Office of Academic Standing indicate that the student has committed a similar offense before the Office of Academic Standing will:

Send a copy of the complaint to the Dean of Students, who will begin disciplinary proceedings

INCOMPLETE POLICY

The following is the policy on incomplete grades. There will be no exceptions to the rule.

An incomplete grade is assigned **ONLY if ALL** of the following conditions have been met:

- The student is missing only one assignment or exam.

- The student has complied with the attendance policy.
- The student presents the instructor with documentation explaining the reason he/she is unable to complete the assignment before the end of the semester.
- [The student has maintained a grade of C or higher at the time the incomplete is given](#)
- A student will not be given an incomplete if the student does not attend class or contact the instructor at the end of the semester.
- Both student and instructor must complete an Incomplete Contract.

Additional Information

Office hours

- Announced by instructor.

Quiz dates/Assignment due dates

- The days and times of the quizzes and exams will be announced well in advance.

College Calendar

- In order to allow for school holidays, it is often necessary to hold classes on days of the week other than those originally scheduled. Consult the College Catalog for changes.

Official Withdrawal Date

- Consult the College Catalog for Official Withdrawal Date.

Student Rights and Responsibilities

- Consult the Student Handbook and College Catalog.

INSTRUCTIONAL OBJECTIVES

1. Introduce students to the field of microbiology, including its history and medical, economic and scientific importance.
2. Familiarize students with the diversity and classification of microorganisms, including Viruses, Bacteria, Archaea, Fungi, Protists, parasitic Helminths and Prions.
3. Reinforce students' knowledge of the functional anatomy of viruses, prions and unicellular organisms (prokaryotic and eukaryotic).
4. Familiarize students with techniques for the safe collection, handling and processing of potentially pathogenic microbial samples.
5. Familiarize students with microbiological techniques for the identification of microorganisms, including enrichment culture, differential staining, fermentation, other metabolic tests and microbial control methods
6. Introduce students to the principles of epidemiology and public health, and their importance in monitoring and controlling the spread of diseases.
7. Reinforce students' knowledge of emerging infectious diseases and immunity.
8. Familiarize students with the diverse methods by which the human immune system protects individuals from pathogens.
9. Reinforce students' skills of literature research and writing through a written term paper based on emergent infectious diseases and their global impacts.
10. Reinforce students' knowledge of laboratory and library research methods in microbiology, including the use of online databases and electronic resources.
11. Familiarize students with the preparation of written reports and oral presentations based on the results of scientific investigations.

PERFORMANCE OBJECTIVES

1. Describe the field of microbiology, including its history and medical, economic and scientific importance.
2. Explain the diversity and classification of microorganisms, including Viruses, Bacteria, Archaea, Fungi, Protists, parasitic Helminths and Prions.
3. Describe the functional anatomy of viruses, prions and unicellular organisms (prokaryotic and eukaryotic).
4. Illustrate techniques for the safe collection, handling and processing of potentially pathogenic microbial samples.
5. Explain microbiological techniques for the identification of microorganisms, including enrichment culture, differential staining, fermentation, other metabolic tests and microbial control methods.
6. Explain the principles of epidemiology and public health, and their importance in monitoring and controlling the spread of diseases.
7. Define emerging infectious diseases and immunity.
8. Compare and contrast the diverse methods by which the human immune system protects individuals from pathogens.
9. Write a term paper based on an emerging infectious disease and address its global impacts.
10. Use laboratory and library research methods in microbiology, including online databases and electronic resources.
11. Prepare and deliver written reports and oral presentations based on the results of scientific investigations.

LECTURE OUTLINE

Timeline	Lecture Topics for the Week	OpenStax Microbiology Readings
Week 1	1 An Invisible World - Introduction 1.1 What Our Ancestors Knew 1.2 A Systematic Approach 1.3 Types of Microorganisms 3 The Cell - Introduction 3.1 Spontaneous Generation 3.2 Foundations of Modern Cell Theory 3.3 Unique Characteristics of Prokaryotic Cells 3.4 Unique Characteristics of Eukaryotic Cells	Ch. 1 (1.1-1.3) Ch. 3 (3.1-3.4)
Week 1	4 Prokaryotic Diversity - Introduction 4.1 Prokaryote Habitats, Relationships, and Microbiomes 4.2 Proteobacteria 4.3 Non-proteobacteria Gram-Negative Bacteria and Phototrophic Bacteria 4.4 Gram-Positive Bacteria 4.5 Deeply Branching Bacteria 4.6 Archaea Selected diseases from: 21.2 Bacterial Infections of the Skin and Eyes 22.2 Bacterial Infections of the Respiratory Tract 23.2 Bacterial Infections of the Urinary System 23.3 Bacterial Infections of the Reproductive System 24.2 Microbial Diseases of the Mouth and Oral Cavity 24.3 Bacterial Infections of the Gastrointestinal Tract 25.2 Bacterial Infections of the Circulatory and Lymphatic Systems 26.2 Bacterial Diseases of the Nervous System	Ch. 4 (4.1- 4.6) Ch. 21 (21.2) Ch. 22 (22.2) Ch. 23 (23.2) Ch. 23 (23.3) Ch. 24 (24.2) Ch. 24 (24.3) Ch. 25 (25.2) Ch. 26 (26.2)
Week 2	5 The Eukaryotes of Microbiology - Introduction 5.1 Unicellular Eukaryotic Parasites 5.2 Parasitic Helminths 5.3 Fungi 5.4 Algae Selected diseases from: 21.4 Mycoses of the Skin 21.5 Protozoan and Helminthic Infections of the Skin and Eyes 22.4 Respiratory Mycoses 23.5 Fungal Infections of the Reproductive System 23.6 Protozoan Infections of the Urogenital System 24.5 Protozoan Infections of the Gastrointestinal Tract 24.6 Helminthic Infections of the Gastrointestinal Tract 25.4 Parasitic Infections of the Circulatory and Lymphatic Systems 26.4 Fungal and Parasitic Diseases of the Nervous System	Ch. 5 (5.1-5.5) Ch. 21 (21.4) Ch. 21 (21.5) Ch. 22 (22.4) Ch. 23 (23.5) Ch. 23 (23.6) Ch. 24 (24.5) Ch. 24 (24.6) Ch. 25 (25.4) Ch. 26 (26.4)
Week 2	6 Acellular Pathogens - Introduction 6.1 Viruses 6.2 The Viral Life Cycle 6.3 Isolation, Culture, and Identification of Viruses 6.4 Viroids, Virusoids, and Prions Selected diseases from: 21.3 Viral Infections of the Skin and Eyes 22.3 Viral Infections of the Respiratory Tract 23.4 Viral Infections of the Reproductive System 24.4 Viral Infections of the Gastrointestinal Tract 25.3 Viral Infections of the Circulatory and Lymphatic Systems 26.3 Acellular Diseases of the Nervous System	Ch. 6 (6.1-6.4) Ch. 21 (21.3) Ch. 22 (22.3) Ch. 23 (23.4) Ch. 24 (24.4) Ch. 25 (25.3) Ch. 26 (26.3)

[illegible]

Week 5	15 Microbial Mechanisms of Pathogenicity • Introduction • 15.1 Characteristics of Infectious Disease • 15.2 How Pathogens Cause Disease • 15.3 Virulence Factors of Bacterial and Viral Pathogens • 15.4 Virulence Factors of Eukaryotic Pathogens 16 Disease and Epidemiology • Introduction • 16.1 The Language of Epidemiologists • 16.2 Tracking Infectious Diseases • 16.3 Modes of Disease Transmission • 16.4 Global Public Health	Ch. 15 (15.1-15.4) Ch. 16 (16.1-16.4)
Week 6	Exam 3 (Ch. 14, 15, 16) 17 Innate Nonspecific Host Defenses • Introduction • 17.1 Physical Defenses • 17.2 Chemical Defenses • 17.3 Cellular Defenses • 17.4 Pathogen Recognition and Phagocytosis • 17.5 Inflammation and Fever 18 Adaptive Specific Host Defenses • Introduction • 18.1 Overview of Specific Adaptive Immunity • 18.2 Major Histocompatibility Complexes and Antigen-Presenting Cells • 18.3 T Lymphocytes and Cellular Immunity • 18.4 B Lymphocytes and Humoral Immunity • 18.5 Vaccines	Ch. 17 (17.1-17.5) Ch. 18 (18.1-18.5)
Week 6	19 Diseases of the Immune System • Introduction • 19.1 Hypersensitivities • 19.2 Autoimmune Disorders • 19.3 Organ Transplantation and Rejection • 19.4 Immunodeficiency • 19.5 Cancer Immunobiology and Immunotherapy 20 Laboratory Analysis of the Immune Response • Introduction • 20.1 Polyclonal and Monoclonal Antibody Production • 20.2 Detecting Antigen-Antibody Complexes • 20.3 Agglutination Assays • 20.4 EIAs and ELISAs • 20.5 Fluorescent Antibody Techniques	Ch. 19 (19.1-19.5) Ch. 20 (20.1-20.5)
Finals week	EXAM 4 (Ch. 17, 18, 19, 20)	Tuesday February 22 nd , 2022

LABORATORY OUTLINE

Lab #	Leboffe Ex #	TOPICS & Exercises	Labster Module
Wk 1 Lab 1 Online	Lab Safety ppt Introduction(p.1-9) 3.1 3.2 3.3	Lab Safety - Lab Safety ppt Microscopy - Introduction to the Light Microscope (3.1) - Calibration of the Ocular Micrometer (3.2) - Examination of Eukaryotic Microbes (3.3)	Labster Demo Practice Simulation Biosafety <u>Due no later than 02/11/22</u> Microscope <u>Due no later than 02/11/22</u>
Wk 1 Lab 2 Online	1.3 (theory only) 1.4 1.5 1.5 6.2	Aseptic Technique - Nutrient Broth and Agar preparation - Aseptic Transfer & Inoculation (1.4) - Streak Plate Methods of Isolation (1.5) - Spread Plate Method (1.6) - Standard Plate Count (Viable Count) (6.2) handout	Bacteria Isolation <u>Due no later than 02/11/22</u> Bacterial quantification by culture: count bacteria with serial dilution <u>Due no later than 02/11/22</u>
Wk 2 Lab 3 Online	2.2 2.3 2.4 3.4 3.5 3.6 3.10 (Theory only)	Record results (1.4,1.5,6.2 and refer to 2.2,2.3 & 2.4) - Colony Morphology (2.2) - Growth Patterns on Slants (2.3) - Growth patterns in broth (2.4) Staining Techniques: - Preparation of smears and simple staining (3.4) - Negative staining (3.5) - Gram staining (3.6) - Wet Mount & Hanging Drop Preparations/Flagella movement (3.10)	The Gram Stain – identify and differentiate bacteria <u>Due no later than 02/11/22</u>
Wk 2 Lab 4 Online	3.7 3.8 3.9	Staining Techniques (cont.) - Acid Fast Staining (3.7) Structural Staining Techniques: - Capsule Staining (3.8) - Endospore Staining (3.9)	Bacterial Growth Curves: Experiment with Bacterial growth <u>Due no later than 02/11/22</u>
Wk 3 Lab 5 Online	2.1 3.12	Microbes in the Environment (handout) - Ubiquity of Microorganism (2.1) (theory only) Morphological Unknown (3.12) - Determine the morphology, Gram reaction and any special structures present or produced by your unknown microbe (endospore, acid fast, capsule)	Bacterial Cell Structures: An Introduction to Bacterial Cells <u>Due no later than 02/11/22</u>
Wk 3 Lab 6 Online	Handout (2.1) 2.6 2.7 2.8 2.9 4.3 4.4 4.5	Gram Stain for Microbes in the Environment (handout lab # 5) Oxygen and the growth of bacteria - Fluid Thioglycollate Medium (2.6) - Anaerobic Jar (2.7) - Temperature response (2.8) - Effect of pH (2.9) Selective media for isolating bacteria - Mannitol Salt Agar (4.3) - MacConkey Agar (4.4) - Eosin Methylene Blue (4.5)	Control of Microbial growth – Explore Decontamination and Selective Toxicity <u>Due no later than 02/11/22</u>

Wk 4 Lab 7 Online	5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8	Selective Tests – Biochemical Tests Carbohydrate Catabolism Fermentation - Glucose Oxidation-Fermentation Test (5.1) - Phenol Red Broth (5.2) - Methyl Red & Voges Proskauer Test (5.3) Respiration - Catalase Test (5.4) - Oxidase Test (5.5) - Nitrate Reduction Test (5.6) - Citrate Test (5.7) - Decarboxylation Test (5.8)	Pasteurization and Sterilization <u>Due no later than 02/11/22</u>
Wk 4 Lab 8 Online	5.9 5.10 5.11 5.12 5.13 5.14 5.15 5.16 5.18 5.21	- Phenylalanine Deamination Test (5.9) Hydrolytic Enzymes - Starch Hydrolysis (5.10) - DNA Hydrolysis (5.11) - Lipid Hydrolysis (5.12) - Casein Hydrolysis (5.13) - Gelatin Hydrolysis (5.14) - Urea Hydrolysis (5.15) - Bile Esculin Test (5.16) Combination Differential Media - SIM Medium (5.18) (H₂S, Indole, Motility) - Blood Agar (5.21)	
Wk 5 Lab 9 Online	2.12 8.3 2.13 7.2	Physical Methods of Control: UV Radiation - Lethal Effect of UV Radiation (2.12) (theory only) - UV radiation – damage and repair (8.3) Demo by Instructor Chemical Methods of Control Chemical Germicides: Disinfectants & Antiseptics (2.13) (theory only) Chemical Methods of Control - Antimicrobial Susceptibility Test (Kirby-Bauer Method) (7.2)	
Wk 5 Lab 10 Online	9.1 9.2 9.3	Identification of Enterobacteriaceae (9.1) Identification of Gram-positive cocci (9.2) Identification of Gram-positive rods (9.3) Continue with Individual Unknown	
Wk 6 Lab 11 Online	2.12 - theory only 8.3- instruct demo 2.13- theory only 7.2 – in groups	Final lab for determination of Individual Unknowns – refer to exercises: Identification of Enterobacteriaceae (9.1) Identification of Gram-positive cocci (9.2) Identification of Gram-positive rods (9.3) Bergey's Manual of Determinative Bacteriology	
Wk 6 Lab 12 Online	9.1 9.2 9.3 <u>Unknown Report Due</u>	Final lab for determination of Individual Unknowns – refer to exercises: Identification of Enterobacteriaceae (9.1) Identification of Gram-positive cocci (9.2) Identification of Gram-positive rods (9.3) Bergey's Manual of Determinative Bacteriology	February 11th
Finals	<u>Lab Exam</u>	Lab Exam on: Labs 1- 9	February 17th

Final Unknown identification report should be a well written and coherent document, and should include the following:

- 1. Introduction include hypothesis** - A short introduction stating the goal of the project. **What** do you intend to find out about with this unknown project? **Why** do you think you will ultimately identify the organism you are hypothesizing about? **How** do you intend to find out what organism you have?
- 2. Methods** (Gram reaction, and other type of staining if applicable, temperatures, biochemical tests, aerotolerance, etc.)
- 3. Results** - pictures may be included, but not required- tables or paragraphs may be included
- 4. Discussion/conclusion** - development and rationale about whether your proposed hypothesis was proven or not based on your data collected (experimentation), results (outcomes of experiments) observations, and conclusion. Here you will need to include results of genus and species. The claim must be backed up by results outcomes (positive, negative, and why you think you have that organism) - in other words, results and identification have to make sense.
- 5. Your perspective on the project** - How working on this project has changed your view about microbes in your live and/or the application in your career.

Identifying the wrong organism does not mean failing the project. You worked hard trying to achieve your goal, it means points are taking off from the original 20 points the assignment is worth.

After considering the points above, final unknown reports are graded in the following manner:

- Correct genus and species = 20 points
- Correct genus and wrong species = 18 points
- Incorrect genus, incorrect species, correct Gram reaction, Same taxonomic group (ex. Enterobacteriaceae or Bacillales and 90% of tests accurate = 17 points
- Incorrect genus, incorrect species, correct Gram reaction, 80% of tests accurate = 16 points
- Incorrect genus, incorrect species, correct Gram reaction, 70% of tests accurate = 15 points
- Incorrect genus, incorrect species, incorrect Gram reaction 50% of tests accurate = 14 points
- Incorrect genus, incorrect species, incorrect Gram reaction, less than 50% of tests accurate = 1-13 points

What the scores mean:

Excellent 90-100% - The student performs all the skills thoroughly and fully understands exceptional understanding of the key features of the skills and project. **Contains no errors**

Good – 80-89% - The student performs almost all the skills and parts fully and demonstrates understanding of the key features of the skills and project **with minimal errors.**

Fair – 70-79% - The student minimally fulfills the major component of the skills and project and parts **with multiple errors.**

Poor – 0-69% - The student performs **multiple significant errors** in fulfilling the major components of the project and skills.