

DEPARTMENT OF ANIMAL SCIENCE

COURSE OUTLINE – FALL 2022

AH 174 LABORATORY PROCEDURES AND MICROBIOLOGY – 4.5 (4.5-0-3) 120HOURS

16 Weeks

Northwestern Polytechnic respectfully acknowledges that we are located on Treaty 8 territory, the traditional homeland and gathering place for many diverse Indigenous peoples. We are honored to be on the ancestral lands of the Cree, Dene/Beaver and Métis, whose histories, languages, and cultures continue to influence our vibrant community. We are grateful to have the opportunity to work, learn, and live on this land.

INSTRUCTOR:	Chris Mizzi DVM Christy Barlund DVM	PHONE:	780-835-6617 780-835-6701
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OFFICE HOURS:	See posted on office doors (Dr. Mizzi 780-228-3018 cell)		

DELIVERY: HyFlex. This course is delivered in person and/or via zoom. Students must have access to a computer with a webcam and reliable internet connection in case of a sudden change to online learning. Technological support is available through helpdesk@nwpolytech.ca.

CALENDAR DESCRIPTION:

Students will develop proficiency in care and use of lab equipment, performing dilutions, conversions and quality control. Features of bacteria, fungi and viruses are discussed and basic microbiological agents are covered. Students will learn to group bacteria and fungi according to staining results, morphology and characteristics.

Practical microbiological procedures will be performed or discussed to help differentiate common microbiological pathogens. Important veterinary infectious diseases and their clinical signs, treatment and human health implications are discussed. Case studies will be used in presentation of course material.

PREREQUISITE(S)/COREQUISITE:

- Must be registered in the NWP Animal Health Technology Program

REQUIRED TEXT/RESOURCE MATERIALS:

- Bassert, McCurnin's Clinical Textbook for Veterinary Technicians, Elsevier, 9th or 10th Edition
- Students must have internet access as the lecture part of the course may be online and lab preparatory work, assignments and submissions will be online.

DELIVERY MODE(S):

Lecture (Dr. Mizzi)

Lab (Dr. Barlund/Dr. Mizzi/Katey)

COURSE OBJECTIVES/LEARNING OUTCOMES:

Lecture:

Unit 1 Introduction to Microbiology. By the end of this unit the student will be able to Define and discuss:

- a. Key words listed by the instructor
- b. The 5 kingdoms of life and super kingdoms
- c. Differences between eukaryote and prokaryote
- d. Significance of bacterial taxonomy
- e. Bergey's method of classifying bacteria
- f. Nomenclature of microorganisms

Unit 2 Bacterial Physiology. By the end of this unit the student will be able to

Define and discuss:

- a. Various cellular arrangements of a microorganism
- b. Difference between gram positive and Gram-negative organisms
- c. Bacterial structure and function of those parts
- d. Nutritional and environmental requirements of bacteria

- e. Process in which bacteria reproduce
- f. Stages of the bacterial growth curve
- g. 3 elements that control a bacterial infection
- h. Koch's postulates
- i. Bacterial pathogenicity

Unit 3 Identification of Bacteria. By the end of this unit the student will be able to Define and discuss:

- a. The cell shape and arrangement of microorganism
- b. Common ingredients in culture media
- c. Common types of culture media
- d. Different types of hemolysis
- e. Differences between selective and differential media
- f. Biochemical tests

Unit 4 Gram positive aerobic cocci. By the end of this unit the student will be able to Define and Discuss:

- a. The 2 families of Gram-positive cocci
- b. How to differentiate between the 2 families
- c. All the *Staphylococcus* species names
- d. General characteristics of Staph, bacteria
- e. Difference between contagious and environmental mastitis
- f. In detail the conditions associated with the various *Staph.* Bacteria
- g. The recommended treatment for infections covered in this unit
- h. All the *Streptococcus* species names
- i. Three methods of differentiating *Strep.* Organisms
- j. The general characteristics of *Strep.*
- k. Which organisms are Gram negative cocci
- l. Characteristics, pathogenesis and treatment of *M. bovis*

Unit 5 Gram positive rods. By the end of this unit the student will be able to Define and Discuss:

- a. The 2 types of endospore forming Gram negative rods
- b. General characteristics of *Clostridium* species
- c. Characteristics of *Listeria*
- d. Characteristic of *Erysipelothrix*

- e. Characteristics of *Corynebacterium*
- f. Characteristics of *Actinomyces*
- g. Characteristics of *Dermatophilus*
- h. Characteristics of *Nocardia*
- i. Characteristics of *Mycobacterium*

Unit 6 Gram negative rods. By the end of this unit the student will be able to Discuss and Define:

- a. The different classes of Gram-negative rods
- b. Characteristics of *E. coli*
- c. Characteristics of *Salmonella*
- d. Characteristics of other Gram-negative rods

Unit 7 Spiral Coiled and Unusual. By the end of this unit the student will be able to Define and Discuss:

- a. Characteristics of *Campylobacter*
- b. Characteristics of the spirochetes
- c. Characteristics of the intracellular bacteria
- d. Characteristics of cell wall free bacteria

Unit 8 Mycology. By the end of this unit the student will be able to Define and Discuss:

- a. The structure and physiology of molds and yeast
- b. How molds and yeast reproduce
- c. Characteristics of Superficial Mycosis
- d. Characteristics of Subcutaneous Mycosis
- e. Characteristics of Systemic Mycosis
- f. Characteristics of Yeast infections
- g. Characteristics of mycotoxins

Unit 9 Virology. By the end of this unit the student will be able to Define and Discuss:

- a. Composition of a virus
- b. Replication process of viruses
- c. Various tests to detect viruses
- d. Characteristics of common animal viruses
- e. Characteristics of prions

Lab:

Lab 1: Laboratory Safety and WHMIS. Upon completion of the lab students will be able to:

- a. Recognize and describe safety hazards within the GPRC Animal Science Lab.
- b. Demonstrate steps on how to respond to hazards within the GPRC Animal Science Lab.
- c. Demonstrate the proper use of fire extinguishers
- d. Discuss the usage of an eye wash station
- e. Explain the location of all exits, first aid kits, fire extinguishers, eye wash stations and SDS sheets within the Animal Science Building.
- f. Obtain WHMIS certificate

Lab 2: Compound Microscope and Instrumentation. Upon completion of this lab students will be able to:

- a. Define and discuss parts of a compound microscope
- b. Perform proper care and maintenance of the compound microscope
- c. Properly use the compound microscope in a veterinary laboratory
- d. Define and discuss basic principles of Stereo and Electron Microscopes
- e. Introduce Microbial Surveillance Quality Assurance Protocol

Lab 3: Bacteria Staining and Morphology. Upon completion of this lab students will be able to:

- a. Perform and explain the technique of aseptic transfer of bacteria
- b. Prepare a bacterial smear
- c. Perform a simple and differential stain and describe the chemical reaction involved in the staining process.

Lab 4: Isolation of Pure Culture (Streak Plate Method). Upon completion of this lab students will be able to demonstrate and discuss:

- a. Methods of obtaining a pure culture of bacteria.
- b. Principle of streak dilution using living bacteria and Tryptic Soy Agar plate.
- c. The purpose and procedure of the KOH test.

Lab 5: Basic Gram-Positive Organisms and Tests. Upon completion of this lab students will be able to:

- a. Identify gram positive organisms using a flow chart
- b. Demonstrate and discuss the procedure of tests used to differentiate gram positive organisms including:
 - a. Gram stain
 - b. Catalase test
 - c. Coagulase test
 - d. CAMP test

Lab 6: Culture and Sensitivity Testing. Upon completion of this lab students will be able to:

- a. Demonstrate and explain antibiotic sensitivity test procedures.
- b. Explain the importance of antibiotic sensitivity testing.
- c. Perform Kirby-Bauer method

Lab 7: Gram Negative Organisms and Rapid Miniaturized Methods. Upon completion of this lab students will be able to:

- a. Perform a gram stain of bacteria provided.
- b. Plate bacteria on MacConkey Agar and describe colony morphology and results of the plated organisms.
- c. Perform, explain and interpret results of an Oxidase test

Lab 7: Dermatophyte Lab. Upon completion of this lab students will be able to:

- a. Explain the principle of a Fungassay or similar test.
- b. Perform and interpret a Fungassay or similar test.
- c. Name media used in culturing fungi.
- d. Explain the principle of the Woods Lamp.
- e. Explain procedures used in diagnosing ringworm.

Lab 8: Mastitis Project. Upon completion of this lab students will be able to:

- a. Demonstrate and explain the isolation and identification of bovine mastitis organisms.
- b. Perform antibiotic sensitivity testing on the isolates.
- c. Explain the use of a flow chart to complete the evaluation of milk samples
- d. Perform a California Mastitis Test with aseptic technique.

TRANSFERABILITY: (if applicable)

Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at the Alberta Transfer Guide main page <http://www.transferalberta.ca>.

** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. **Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

EVALUATIONS:

GRADING CRITERIA:
GRADING CONVERSION CHART for ANIMAL HEALTH TECHNOLOGY
OVERALL GRADE POINT AVERAGE HAS TO BE 2.0 OR HIGHER TO BE SUCCESSFUL IN THE AHT PROGRAM.

Alpha Grade	4-point Equivalent	Percentage Guidelines	Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	90-100	C+	2.3	67-69
A	4.0	85-89	C	2.0	63-66
A-	3.7	80-84	C-	1.7	60-62
B+	3.3	77-79	FAIL	1.3	55-59
B	3.0	73-76	FAIL	1.0	50-54
B-	2.7	70-72	WF	0.0	00-49

EXAMINATIONS	Mark Distribution
A. Quizzes, Lab & Assignments	30%
B. Midterm Exam (lecture)	20%
C. Final Exam (lecture)	25%
D. Final Exam (lab)	25%
	100%

A minimum of 60% must be obtained in order to successfully pass AH174. There will be a 5% deduction for each lab missed without a valid excuse.

COURSE SCHEDULE/TENTATIVE TIMELINE:

As posted on separate schedule

STUDENT RESPONSIBILITIES:

Enrolment at NWP assumes that the student will become a responsible citizen of the College. As such, each student will display a positive work ethic, take pride in and assist in the maintenance and preservation of Institute property, and assume responsibility for his/her education by researching academic requirements and policies; demonstrating courtesy and respect toward others; and respecting instructor expectations concerning attendance, assignments, deadlines, and appointments.

STATEMENT ON PLAGIARISM AND CHEATING:

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, refer to the Student Conduct section of the Northwestern Polytechnic Calendar at <https://www.nwpolytech.ca/programs/calendar/> or the Student Rights and Responsibilities policy which can be found at <https://www.nwpolytech.ca/about/administration/policies/index.html>.

**Note: all Academic and Administrative policies are available on the same page.

YEAR: 2022

