V T 70: FUNDAMENTALS OF VETERINARY DIAGNOSTIC IMAGING

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2021
Units:	4
Hours:	3 lecture, 3 laboratory per week (72 total per quarter)
Prerequisite:	V T 54B.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU
Grade Type:	Letter Grade Only
Repeatability:	Not Repeatable

Student Learning Outcomes

- Know and apply the principles of veterinary radiography to consistently produce diagnostic radiographs of animal patients.
- Routinely and unfailingly employ all of the principles of radiation safety when working around ionizing radiation.

Description

Introduction to the principles of veterinary radiography and ultrasonography for veterinary technician students, including radiographic and ultrasonographic terminology. Physics of X-ray and ultrasound production and interaction with matter. Explanation of MRI, CT, and nuclear medicine appropriate to the veterinary technician. Occupational safety and radiation protection. Proper use and maintenance of standard and digital X-ray equipment. Radiographic exposure factors, technique chart development and usage, and patient positioning required for production of diagnostic radiographs. Processing of radiographic film. Discussion of equipment, materials and special radiographic studies common in veterinary practice. Radiographic exposure troubleshooting and common artifacts. Intended for students in the Veterinary Technology Program; enrollment is limited to students accepted in the program.

Course Objectives

The student will be able to:
A. Describe the history, purpose, and principles of radiography in a clinical setting, and the role of the veterinary technician in obtaining diagnostic quality radiographs.
B. Apply principles of radiation physics, exposure factor settings, and patient positioning to the production of diagnostic radiographs in the laboratory and clinical setting.
C. List and explain the parts of an X-ray machine and the ancillary equipment and supplies required to produce the radiographic image.
D. Integrate the knowledge of the various factors that affect radiographic image quality and perform proper radiographic examinations of small and large animal patients.
E. Create and use a radiographic technique chart.
F. Properly care for equipment and process radiographic film.
G. Protect personnel and patients from ionizing radiation and demonstrate proper radiation safety procedures when working around ionizing radiation.
H. Conduct the common special diagnostic procedures in veterinary radiography.
I. Describe ultrasonic imaging technology: creation of U/S images, use and maintenance of equipment, assist in U/S guided biopsy.
J. Discuss alternate imaging modalities including MRI, CT.

Course Content

A. Introduction to radiology and production of images
1. History of human and veterinary radiology
2. Physics of radiation
3. Principles of generators, transformers, rectification
4. Patient positioning
5. Safe operating procedures for patients and personnel
6. Radiograph processing
7. Radiographic recording
B. Principles of radiation physics, exposure factor settings, and patient positioning
1. Voltage, amperage, electricity, electrons
2. X-ray head, anode, cathode
3. Generation and targeting of primary beam
4. Grids, trays, buckeys, collimation
5. Measuring patient, determining technique, kVp, mAs
6. Intensifying screens
7. Latent image
8. Film processing: manual and automatic
9. Radiographic recording
C. Parts of an X-ray machine, ancillary equipment and supplies
1. Head
2. Height adjustment
3. Table
4. Film holder, film, screens, cassettes
5. Control panel
6. Electrical supply
7. Emergency shut-off
8. Developing tanks and chemicals
9. Processor and chemicals
10. Drying and storage
11. Hazardous materials collection and disposal
D. Factors affecting radiographic image quality
1. Milliamperage (mA): effect on film, definition
2. Time: effect on film, definition
3. Milliampere-seconds
4. Distance: inverse square law
5. Kilovoltage (kVp): Effect on wavelength, absorption of X-rays, contrast
6. Density
7. Detail
8. Contrast
9. Magnification
10. Distortion
11. Film identification and marking
12. Artifacts
13. Perform proper radiographic examinations of small and large animal patients
a. Assess radiograph quality
E. Create and use a radiographic technique chart
1. Body types
2. Age
3. Thickness of part

4. Contrast media
5. Splints
6. Filters
7. Grids
8. Cones
F. Properly care for equipment and process radiographic film
1. Use of product manual
2. Cleaning, regular maintenance of machine and cassettes
3. Periodic maintenance by qualified service person
4. Proper darkroom environment
5. Proper film and cassette storage
G. Proper radiation safety procedures for personnel and patients
1. Government and state requirements
2. Knowledge of time, distance, shielding
3. Proper use of safety equipment
4. Monitoring badges
5. Knowledge of rights and requirements for special conditions (e.g., pregnancy)
6. Techniques to minimize repeat exposure
H. Common special diagnostic procedures in veterinary radiography
1. Survey films
2. Positive contrast techniques
3. Negative contrast techniques
I. Ultrasonic (U/S) imaging technology
1. Ultrasound machines
2. Piezoelectric crystals
3. Principles of U/S wave generation and recording
4. Factors that enhance or limit U/S imaging
5. B and M mode techniques
6. U/S guided biopsy
7. Proper use and maintenance of U/S equipment
J. Alternate imaging modalities
1. Discuss the basic principles of MRI, CT, nuclear medicine
2. Safe use of equipment
3. Patient selection, preparation, positioning
4. Pros and cons of each modality
5. Technician's role for each modality

Lab Content

A. Study of veterinary radiographic anatomy using models, manikins, prepared anatomic skeletons, and live animals.
B. Demonstration and performance of all steps required to produce a diagnostic radiograph including proper exposure settings and patient positioning.
C. Ultrasound training using animals and models.
D. Practical training in the American Veterinary Medical Association Committee on Veterinary Technician Education and Activities List of Essential Skills expected of graduate veterinary technicians using a set of standard criteria as a guideline for the accomplishment of performance objectives.
E. Emphasis is on skill development and hands-on experience in all required areas pertinent to this class.

Special Facilities and/or Equipment

A. Classroom with projection and DVD playback capabilities, and radiograph viewing screen(s).
B. Laboratory equipped with stationary and portable digital and conventional X-ray machines and ancillary radiographic equipment and supplies.
C. Radiograph viewing screens.
D. Diagnostic ultrasound machine.
E. Live animal patients and holding facilities.
F. Sedation and anesthesia capabilities, and patient monitoring equipment.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Written quizzes and examinations
Production of a radiographic technique chart
Compilation of a written educational handout covering principles of radiation safety and giving an oral presentation on this topic
Completion of a technique chart, demonstration of processing film, cleaning and and storing screens and cassettes
Taking diagnostic quality radiographs of common views (lateral, ventrodorsal abdomen, thorax, hips, extremities)
Demonstrate ability to assess radiographs

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture
Discussion
Laboratory
Demonstration

Representative Text(s) and Other Materials

Brown M., and L.C. Brown. Lavin's Radiography for Veterinary Technicians, 6th ed.. 2018.

California Veterinary Medical Board, Veterinary Radiation Control Regulations (2012), www.vmb.ca.gov/inspections/radiation.shtml (most up-to-date version)

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

A. Weekly reading assignments from text, class handouts, and outside sources, ranging from 30-100 pages per week.
B. Written short answer essay questions.
C. Critical thinking assignment involving assessment of clinical cases and use of imaging. Selection of appropriate diagnostic techniques and nursing assessments.
D. Case reports from patients seen in clinics.
E. Quizzes.
F. Laboratory practical examination at the end of the quarter.

Discipline(s)

Registered Veterinary Technician