VT-1700: VETERINARY DIAGNOSTIC IMAGING

Cuyahoga Community College

Viewing: VT-1700: Veterinary Diagnostic Imaging
Board of Trustees:
2016-05-26

Academic Term:
2017-08-24

Subject Code
VT - Veterinary Technology

Course Number:
1700

Title:
Veterinary Diagnostic Imaging

Catalog Description:
Introduction to radiography, ultrasonography, CT, MRI, and nuclear scintigraphy imaging modalities. Preparation, use and maintenance of radiography and ultrasonography equipment. Acquisition and processing of digital and analog diagnostic images.

Credit Hour(s):
3

Lecture Hour(s):
2

Lab Hour(s):
3

Requisites

Prerequisite and Corequisite
VT-1401 Veterinary Science I; and BIO-1420 Anatomy and Physiology of Domestic Animals II or concurrent enrollment.

I. ACADEMIC CREDIT

Academic Credit According to the Ohio Department of Higher Education, one (1) semester hour of college credit will be awarded for each lecture hour. Students will be expected to work on out-of-class assignments on a regular basis which, over the length of the course, would normally average two hours of out-of-class study for each hour of formal class activity. For laboratory hours, one (1) credit shall be awarded for a minimum of three laboratory hours in a standard week for which little or no out-of-class study is required since three hours will be in the lab (i.e. Laboratory 03 hours). Whereas, one (1) credit shall be awarded for a minimum of two laboratory hours in a standard week, if supplemented by out-of-class assignments which would normally average one hour of out-of-class study preparing for or following up the laboratory experience (i.e. Laboratory 02 hours). Credit is also awarded for other hours such as directed practice, practicum, cooperative work experience, and field experience. The number of hours required to receive credit is listed under Other Hours on the syllabus. The number of credit hours for lecture, lab and other hours are listed at the beginning of the syllabus. Make sure you can prioritize your time accordingly. Proper planning, prioritization and dedication will enhance your success in this course. The standard expectation for an online course is that you will spend 3 hours per week for each credit hour.

II. ACCESSIBILITY STATEMENT

If you need any special course adaptations or accommodations because of a documented disability, please notify your instructor within a reasonable length of time, preferably the first week of the term with formal notice of that need (i.e. an official letter from the Student Accessibility Services (SAS) office). Accommodations will not be made retroactively.

For specific information pertaining to ADA accommodation, please contact your campus SAS office or visit online at http://www.tri-c.edu/accessprograms. Blackboard accessibility information is available at http://access.blackboard.com.

Eastern (216) 987-2052 - Voice
Metropolitan (216) 987-4344 - Voice
Western (216) 987-5679 - Voice
III. ATTENDANCE TRACKING

Regular class attendance is expected. Tri-C is required by law to verify the enrollment of students who participate in federal Title IV student aid programs and/or who receive educational benefits through other funding sources. Eligibility for federal student financial aid is, in part, based on your enrollment status.

Students who do not attend classes for the entire term are required to withdraw from the course(s). Additionally, students who withdraw from a course or stop attending class without officially withdrawing may be required to return all or a portion of the financial aid based on the date of last attendance. Students who do not attend the full session are responsible for withdrawing from the course(s).

Tri-C is responsible for identifying students who have not attended a course, before financial aid funds can be applied to students’ accounts. Therefore, attendance will be recorded in the following ways:

For in-person courses, students are required to attend the course by the 15th day of the semester, or equivalent for terms shorter than 5-weeks, to be considered attending. Students who have not met all attendance requirements for an in-person course, as described herein, within the first two weeks of the semester, or equivalent, will be considered not attending and will be reported for non-attendance and dropped from the course. For blended-learning courses, students are required to attend the course by the 15th day of the semester, or equivalent for terms shorter than 5-weeks, or submit an assignment, to be considered attending. Students who have not met all attendance requirements for a blended-learning course, as described herein, within the first two weeks of the semester, or equivalent, will be considered not attending and will be reported for non-attendance and dropped from the course.

For online courses, students are required to login at least two (2) times per week and submit one (1) assignment per week for the first two (2) weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for an online course, as described herein, within the first two weeks of the semester, or equivalent, will be considered not attending and will be reported for non-attendance and dropped from the course.

At the conclusion of the first two weeks of a semester, or equivalent, instructors report any registered students who have “Never Attended” a course. Those students will be administratively withdrawn from that course. However, after the time period in the previous paragraphs, if a student stops attending a class, wants or needs to withdraw, for any reason, it is the student’s responsibility to take action to withdraw from the course. Students must complete and submit the appropriate Tri-C form by the established withdrawal deadline.

Tri-C is required to ensure that students receive financial aid only for courses that they attend and complete. Students reported for not attending at least one of their registered courses will have all financial aid funds held until confirmation of attendance in registered courses has been verified. Students who fail to complete at least one course may be required to repay all or a portion of their federal financial aid funds and may be ineligible to receive future federal financial aid awards. Students who withdraw from classes prior to completing more than 60 percent of their enrolled class time may be subject to the required federal refund policy.

If illness or emergency should necessitate a brief absence from class, students should confer with instructors upon their return. Students having problems with class work because of a prolonged absence should confer with the instructor or a counselor.

IV. CONCEALED CARRY STATEMENT

College policy prohibits the possession of weapons on college property by students, faculty and staff, unless specifically approved in advance as a job-related requirement (i.e., Tri-C campus police officers) or, in accordance with Ohio law, secured in a parked vehicle in a designated parking area only by an individual in possession of a valid conceal carry permit.

As a Tri-C student, your behavior on campus must comply with the student code of conduct which is available on page 29 within the Tri-C student handbook, available athttp://www.tri-c.edu/student-resources/documents/studenthandbook.pdfYou must also comply with the College’s Zero Tolerance for Violence on College Property available athttp://www.tri-c.edu/policies-and-procedures/documents/3354-1-20-10-zero-tolerance-for-violence-policy.pdf

Outcomes

Course Outcome(s):
Implement recommended radiation safety measures.

Objective(s):
1. Describe the hazards of ionizing radiation and articulate the dose limits for radiation exposure.
2. Explain principles of radiation safety including the concept of "ALARA".
3. Demonstrate methods to reduce exposure of personal and patients to x-radiation.
4. Describe safety measures for alternative imaging technologies including MRI, CT and nuclear scintigraphy.

Course Outcome(s):
Operate and maintain diagnostic imaging equipment.
Objective(s):
1. Explain how x-rays are produced.
2. Explain how the characteristics of the x-ray beam and appearance of a finished image are influenced by x-ray machine settings.
3. Describe the mechanics and function of x-ray generating equipment, image receptors, and processing equipment.
4. Operate and care for x-ray generating equipment, digital and analog x-ray receptors, and digital and analog x-ray processing equipment.
5. Demonstrate proper maintenance of radiographic equipment, including recognition of faulty equipment operation.
6. Implement radiographic quality control measures.
7. Describe the mechanics, operation, and care of ultrasonography equipment.
8. Describe principles of operation of alternative imaging equipment including MRI, CT, and nuclear scintigraphy.

Course Outcome(s):
Create diagnostic radiographic images of live animals using radiographic equipment.

Objective(s):
1. Choose, prepare and position image receptors.
2. Develop and utilize radiographic technique charts to select machine settings that minimize the need for repeat exposures.
3. Prepare and operate stationary, portable and dental x-ray generating equipment to create diagnostic radiographic images.
5. Perform radiographic contrast studies.

Course Outcome(s):
Prepare and position patients of various species for radiographic and other imaging studies.

Objective(s):
1. Position dogs and cats for common soft tissue and orthopedic radiographic studies using topographical landmarks.
2. Position horses or equine models for common radiographic studies using topographical landmarks.
3. Perform radiographic screening techniques for canine hip dysplasia.
4. Demonstrate an understanding of the modifications of diagnostic imaging techniques as they apply to exotic mammals, birds, and other exotic animals.
5. Assist with an ultrasound examination of a veterinary patient.

Course Outcome(s):
Assess, store, and maintain radiographs images.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):
1. Assess radiographic image quality and articulate suggestions designed to maximize diagnostic usefulness.
2. Identify common analog and digital artifacts including causes and preventive measures.
3. Complete radiographic logs, reports, and records.
4. Label, file, and retrieve radiographic images.

Methods of Evaluation:
1. Lecture and laboratory quizzes
2. Unit and final lecture examinations
3. Laboratory practical examinations
4. Clinical performance evaluations
5. Homework assignments
6. Radiograph portfolio

Course Content Outline:
1. Radiation safety
   a. Hazards of ionizing radiation including types of biologic damage
   b. Sources of exposure
c. Measurement of radiation exposure
d. Devices used to measure radiation exposure
e. Agencies that regulate exposure limits (Maximum Principles Dose)
f. Minimizing exposure using the “As Low As Reasonably Achievable” (ALARA) principles
g. Care and use of personal protective equipment

2. X-ray production
   a. Definition of x-radiation
   b. Properties and characteristics of x-radiation
   c. Generation of x-radiation

3. Components of the x-ray machine
   a. The x-ray tube
      i. Cathode and anode
      ii. Tube failure (types, recognition, causes, and prevention)
   b. Electrical Components
      i. Power supply and transformers
      ii. Electrical circuits and timer switch
      iii. Rectifier
      iv. Generator
   c. Collimator
   d. Tube stand and control panel

4. Production of radiographic images
   a. X-ray-tissue interaction
      i. The five subject densities
      ii. Subject density and contrast
      iii. Radiographic density and contrast
   b. Exposure factors
      i. milliampseconds (mAs)
      ii. Kilovoltage peak (kVp)
      iii. Source-image distance (SID)
      iv. How exposure factors affect the x-ray beam and finished image

5. Radiographic quality
   a. Radiographic density
   b. Radiographic contrast (short scale vs. long scale)
   c. Scatter radiation
      i. Origin and effects of scatter
      ii. Control of scatter
   d. Grids
      i. Function of a grid
      ii. Grid types and parts
      iii. Use of a grid
      iv. Causes of and prevention of grid artifacts
   e. Geometric distortion and unsharpness
      i. Magnification
      ii. Foreshortening
      iii. Elongation
      iv. Unsharpness
      v. Minimizing distortion and unsharpness
   f. Recognition and prevention of artifacts and technical errors
      i. Exposure errors
      ii. Analog processing errors
      iii. Digital processing errors
   g. Maximizing image quality
   h. Quality control/quality assurance

6. Film-based systems (analog systems)
   a. How film-based systems work
   b. Uses for film-based receptors
   c. Film cassettes
VT-1700: Veterinary Diagnostic Imaging

5

i. Structure and function
ii. Types and sizes
iii. Care
d. Intensifying screens
   i. Structure and function
   ii. Types and sizes
   iii. Screen speed
   iv. Relationship of screen speed, machine settings, and finished image
   v. Screen care
e. X-ray film
   i. Structure and function
   ii. Types and sizes
   iii. Latent image
   iv. Film speed and latitude
   v. Image resolution
   vi. Film care
   vii. Film identification and filing
f. Film processing
   i. Dark room organization and light-proofing
   ii. Processing chemicals
   iii. 5 steps of processing
   iv. Operation and maintenance of automatic processors
   v. Silver recovery
g. Image identification
   i. Required information
   ii. Methods of film identification
   iii. Directional and time indicators
   iv. Limb indicators and Mitchell Markers
h. Film filing, storage and retention

7. Digital Systems
a. How digital systems work
b. Comparison to film-screen systems
c. Hardware and software used in digital systems
   i. Hospital Information System (HIS) and Radiology Information System (RIS)
   ii. Picture Archiving and Communication System (PACS)
   iii. Digital Imaging and Communications in Medicine (DICOM)
   iv. Image backup
d. Digital Technology
   i. Pixels
   ii. Matrix and field of view
   iii. Contrast resolution and spatial resolution
   iv. Bit depth and dynamic range
   v. LGM level (measure of average exposure level)
e. Cassette-based digital systems (Computed Radiography or CR systems)
   i. CR Photostimulable phosphor plates
   ii. CR Scanners
   iii. CR Software
f. Cassette-less digital systems (Digital Radiography or DR systems)
   i. How DR systems work
   ii. Indirect vs. direct digital radiography (DDR) systems
g. Digital processing
   i. Algorithms
   ii. Windowing and leveling
   iii. Cropping and masking
   iv. Magnification and inversion
   v. Annotation
h. Digital artifacts

8. Dental radiography
a. Dental machines and equipment
b. Intraoral analog dental image receptors
   i. Film sizes, speeds, and types
   ii. Identification of the area of interest (AOI) using the “bump”
c. Intraoral digital dental image receptors
   i. Size and speed
   ii. Identification of the AOI using the digital marker
   iii. Protecting the receptor
d. Acquiring the view
   i. Patient restraint and position
   ii. Tube position
   iii. Receptor position
   iv. Positioning aids
   v. View used for each anatomical AOI
e. Parallel technique
f. Bisecting angle technique
g. Manual processing using the chairside darkroom
h. Digital processing
   i. Use of software and managing images
9. Developing a technique chart
   a. Purpose for a technique chart
   b. Preparation
   c. Trial exposures
   d. Completing the chart
10. Assessing a finished radiograph
    a. Routine orientation of an image
    b. Assessing density and penetration
    c. Assessing sharpness
    d. Assessing positioning
    e. Recognition of artifacts and technical errors
11. Radiographic positioning
    a. Positioning terminology
    b. For each AOI:
       i. Routine views
       ii. Special views
       iii. Patient preparation
       iv. Measurement
       v. Centering
       vi. Collimation
       vii. Patient, limb, and head placement
       viii. Special considerations
       ix. Manual restraint/positioning aids
       x. Selecting an image receptor
       xi. Labeling the image
       xii. Setting the machine
12. Small animal radiography
    a. Thorax
    b. Abdomen
    c. Forelimb
    d. Hindlimb
    e. Skull
    f. Spine
13. Equine radiography
    a. Safety and restraint
    b. Portable machine
    c. Patient preparation
    d. Radiation safety
    e. Positioning devices and ancillary equipment
f. Anatomic AOI and view names

g. Studies of the distal limb

h. Additional studies

14. Radiography of exotic animals
   a. Principles of exotic animal radiography
   b. Routine views for birds, reptiles, and exotic mammals
   c. Patient restraint and special equipment

15. Procedures
   a. Methods for diagnosis
      i. Orthopedic Foundation for Animals (OFA)
      ii. PennHIP
   b. Fluoroscopy

16. Contrast studies
   a. Indications for contrast studies
   b. Positive media
      i. Barium sulfate
      ii. Radiopaque markers
      iii. Iodine preparations
      iv. Characteristics, uses, and cautions
   c. Patient preparation
   d. Contrast studies of the gastrointestinal (GI) system
      i. Esophogram
      ii. Upper GI series
   e. Contrast studies of the urinary system
      i. Excretory urogram
      ii. Retrograde cystogram
      iii. Urethrogram
      iv. Other contrast studies
      v. Myelogram
      vi. Miscellaneous studies

17. Ultrasound
   a. Terminology of ultrasound
   b. Ultrasound physics
      i. The interaction of sound waves and tissues
      ii. Creation of the image
   c. Preparing and maintaining ultrasound equipment and transducers
      i. Machine controls
      ii. Selecting transducers
      iii. Use and care of transducers
   d. Display modes (B, M, and Doppler)
      i. Uses for each mode
      ii. Image appearance for each mode
   e. Assisting with an ultrasound examination
      i. Patient preparation and positioning
      ii. Using the probe
   f. Abdominal studies
   g. Echocardiography

18. Alternative technologies
   a. Modalities
      i. Computed tomography (CT)
      ii. Nuclear scintigraphy
      iii. Magnetic resonance imaging (MRI)
   b. Indications for alternative technologies
      i. Information provided by each modality
      ii. Advantages and limitations of each modality
c. Patient preparation
   d. Workplace safety for alternative imaging technologies

Resources


Resources Other
Clinician”s Briefhttp://www.cliniciansbrief.com/
Veterinary Learning Systemshttps://www.vetlearn.com/
DVM360http://www.dvm360.com/

Top of page
Key: 4460