

**JEFFERSON COLLEGE**

**COURSE SYLLABUS**

**VAT252**

**APPLIED RADIOLOGY**

2 Credit Hours

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## VAT252 Applied Radiology

### I. CATALOGUE DESCRIPTION

- A. Pre-requisites: VAT101 Introduction to Veterinary Tech, VAT106 Applied Pharmacology, VAT113 Principles of Clinical Medicine I, VAT114 Principles of Clinical Medicine II, VAT199 Veterinary Technology Internship, VAT250 Veterinary Hospital Technology I, VAT258 Clinical Pathological Techniques, and VAT266 Large Animal Technology I (all courses must be completed with a grade of “C” or better) and reading proficiency
- B. 2 Semester Credit Hours
- C. Applied Radiology is a lecture/laboratory course covering basic principles of radiation safety, preparing technique charts, positioning and radiographing domestic animal species, and processing films. Also included are the identification and solution of problems common in veterinary radiology. (S)
- D. Fulfills degree requirement for the Associate of Applied Science degree in Veterinary Technology

### II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

Demonstrate proper film identification techniques; recognize common film labeling systems; and demonstrate proper film filing techniques	In-class exercises, quizzes, laboratory assignments, exam, and final exam
Explain the properties of x-ray production; differentiate the parts of the x-ray tube/machine and explain their role in the production of x-radiation; describe the features and uses of various types of x-ray equipment; and list the features, advantages, disadvantages of, and uses for computed and digital radiography equipment	In-class exercises, homework assignments, quizzes, laboratory assignments, exam, and final exam
Identify and prevent common radiography artifacts; predict proper exposure factors, times, and correct focal film distance; and determine proper exposure time to create quality radiographic images	In-class exercises, homework assignments, quizzes, laboratory assignments, laboratory practical exam, and final exam
Describe the purpose of technique chart; formulate a technique chart; and demonstrate proper usage of that chart	In-class exercises, quizzes, laboratory assignments, exam, and final exam
Explain the principles of radiographic image formation; compare and contrast nonscreen x-ray film and film-screen cassette-based systems; and produce quality x-ray films	In-class exercises, homework assignments, quizzes, laboratory assignments, laboratory practical exam, and final exam
Discuss the design, features, and organization of an x-ray darkroom; use and maintain equipment used to process x-ray film; operate the automatic x-ray	In-class exercises, homework assignments, quizzes, laboratory

processor; determine radiographic film detail, including contrast and density; explain how film detail is controlled by changing factors in film production; describe common technical errors and artifacts and how to minimize them; and list common non-processing and processing errors	assignments, laboratory practical exam, and final exam
Explain the hazards of x-radiation; define the units of measurement used to quantify x-radiation and the methods used to monitor x-radiation exposure; define maximum permissible dose; describe the principles and practices used to minimize exposure to x-radiation; and identify and properly use personal protective equipment	In-class exercises, homework assignments, quizzes, laboratory assignments, laboratory practical exam, and final exam
Recall commonly used radiographic contrast agents; perform diagnostic contrast studies; and explain how contrast procedures are used to image various body systems for diagnostic purposes	In-class exercises, quizzes, laboratory assignments, and final exam
Explain the importance of appropriate patient restraint when performing radiographic studies; identify normal radiographic anatomy; and demonstrate proper positioning techniques for various radiographic studies	In-class exercises, homework assignments, quizzes, laboratory assignments, laboratory practical exam, and final exam
Describe the indications for and characteristics of ultrasonography, nuclear medicine, computed tomography (CT), and magnetic resonance imaging (MRI); explain the basic principles of the production of an ultrasound image; recognize the equipment used for different types of ultrasound images; and observe ultrasound images for normal and abnormal appearance	In-class exercises, homework assignments, quizzes, laboratory assignments, and final exam

### III. OUTLINE OF TOPICS

- A. Radiographs as Part of the Medical Record
  - 1. Radiographic film identification
  - 2. Radiographic film labeling systems
  - 3. Radiographic film filing
  
- B. Production of X-Rays
  - 1. Properties of x-ray production
  - 2. Parts of the x-ray tube and machine and their role in the generation of x-radiation
  
- C. Radiographic Equipment
  - 1. Features of and uses for portable, mobile, stationary, and fluoroscopic x-ray equipment
  - 2. Features, advantages, and disadvantages of, and uses for computed radiography and digital radiography equipment

- D. Image Quality and Exposure Factors
  - 1. Identification and prevention of common radiography artifacts
  - 2. DICOM, PACS, and RIS
  - 3. Milliamperage (mA)
  - 4. Exposure time
  - 5. Kilovoltage (KvP)
  - 6. Focal film distance
  
- E. Technique Chart
  - 1. Purpose of technique chart
  - 2. Formulation of technique chart
  - 3. Proper use of technique chart
  
- F. Image Formation
  - 1. Principles of image formation
  - 2. Nonscreen x-ray film
  - 3. Film-screen cassette-based systems
  
- G. Film Processing
  - 1. Design, features, and organization of an x-ray darkroom
  - 2. Use and maintenance of equipment used to process x-ray film
  - 3. Operation of the automatic processor
  
- H. Film Quality
  - 1. Radiographic film detail
  - 2. Film contrast
  - 3. Film density
  - 4. How factors are controlled by changing milliamperage and kilovoltage to optimize image quality
  - 5. Common technical errors and artifacts and how to minimize them
  - 6. Common non-processing errors
  - 7. Common processing errors
  
- I. Radiation Safety
  - 1. Hazards of x-radiation
  - 2. Units of measurement used to quantify x-radiation
  - 3. Methods used to monitor x-radiation exposure
  - 4. Maximum permissible dose
  - 5. Principles and practices used to minimize exposure to x-radiation
  - 6. Personal protective equipment
  
- J. Radiographic Contrast Agents
  - 1. Commonly used positive and negative radiographic contrast agents
  - 2. Production of diagnostic contrast studies
  - 3. Contrast procedures used to image the gastrointestinal system, urinary system, and spinal cord

- K. Principles of Patient Positioning
  - 1. Importance of appropriate restraint
  - 2. Normal radiographic anatomy
  - 3. Proper positioning techniques for various radiologic studies
  
- L. Ultrasonography, Nuclear Medicine, Computed Tomography (CT), and Magnetic Resonance Imaging (MRI)
  - 1. Indications for and characteristics of ultrasonography in diagnostic imaging
  - 2. Basic principles of production of an ultrasound image
  - 3. Patient preparation for ultrasonography
  - 4. Equipment used to produce a B-mode, M-mode, or Doppler ultrasound image
  - 5. Appearance of an ultrasound image and the appearance and cause of common artifacts
  - 6. Indications and characteristics of therapeutic and diagnostic nuclear medicine
  - 7. Indications and characteristics of diagnostic computed tomography
  - 8. Indications and characteristics of diagnostic magnetic resonance imaging

#### IV. METHOD(S) OF INSTRUCTION

- A. Lectures
- B. Laboratory assignments including live animal models
- C. In-class exercises
- D. Homework Assignments
- E. Textbooks
- F. Audio-visual aids

#### V. REQUIRED TEXTBOOK(S)

- A. McCurnin, D., *Clinical Textbook for Veterinary Technicians*, (Current edition). St. Louis: Saunders Publishing
- B. Han, C. and Hurd, C., *Practical Diagnostic Imaging for the Veterinary Technician*, (Current edition). St. Louis: Elsevier Mosby Publishing

#### VI. REQUIRED MATERIALS

Appropriate Laboratory Attire (Scrubs)

## VII. SUPPLEMENTAL REFERENCES

None

## VIII. METHOD OF EVALUATION

### A. Distribution of Final Grade

There are written exams/quizzes, in-class exercises, homework assignments, and a comprehensive final, all of which comprise the final lecture grade.

Laboratory participation, laboratory assignments, a film identification test, and a laboratory practical examination comprise the final laboratory grade.

A student must independently pass both the lecture portion and the laboratory portion of each class to advance in the program.

Class participation and attendance are expected of the students and the instructor reserves the right to award or detract percentage points based on these attributes.

### B. Assignment of Final Letter Grades

A = 93-100

B = 84-92

C = 75-83

D = 60-74

F = below 60

### C. Attendance Policy

Student attendance is mandatory. There are no excused absences. If a student misses more than 15% of the total time that the class meets in a semester, the student may be prohibited from attending the class by the instructor. In such cases, the student must officially withdraw from the course, by the designated withdrawal date, in order to reduce the possibility of receiving an "F" for the course. **Tardiness beyond 10 minutes is considered an absence.**

Students are permitted to miss one exam date with no penalty. Make up exams are taken in the Testing Center within 3 days of the original exam.

The instructor may make exceptions to this policy in certain cases, i.e., illness requiring hospitalization, death in the family, etc.

## IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the

Coordinator of Disability Support Services (Technology Center 101; phone 636-481-3169).

#### X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College website <http://www.jeffco.edu>).

#### XI. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

#### XII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically-related activities such as reading, studying, and completing assignments. Specifically, time spent on academically-related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.

Since this class is a face-to-face, 16-week, 2 credit hour class, the expectation is that 75 hours be spent on academically-related activities over the 16-week period. The class meets face-to-face for 43 hours over the 16 weeks, so it is expected that 32 hours be spent on outside-of-class activities. This means you should spend about 2 hours each week reading the textbook, completing assignments, studying for exams, etc.