VAT252
APPLIED RADIOLOGY

2 Credit Hours

Revised by:
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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)

II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

<table>
<thead>
<tr>
<th>Demonstrate proper film identification techniques; recognize common film labeling systems; and demonstrate proper film filing techniques</th>
<th>In-class exercises, quizzes, laboratory assignments, exam, and final exam</th>
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<tr>
<td>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</td>
<td>In-class exercises, homework assignments, quizzes, laboratory assignments, exam, and final exam</td>
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<tr>
<td>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</td>
<td>In-class exercises, homework assignments, quizzes, laboratory assignments, laboratory practical exam, and final exam</td>
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<td>Describe the purpose of technique chart; formulate a technique chart; and demonstrate proper usage of that chart</td>
<td>In-class exercises, quizzes, laboratory assignments, exam, and final exam</td>
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<td>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</td>
<td>In-class exercises, homework assignments, quizzes, laboratory assignments, laboratory practical exam, and final exam</td>
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<td>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 processor; determine radiographic film detail, including contrast and density; explain how film detail is controlled by changing factors in film production;</td>
<td>In-class exercises, homework assignments, quizzes, laboratory assignments, laboratory practical exam, and final exam</td>
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<td>Task</td>
<td>Assessment</td>
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<td>Describe common technical errors and artifacts and how to minimize them; and list common non-processing and processing errors</td>
<td>In-class exercises, homework assignments, quizzes, laboratory assignments, laboratory practical exam, and final exam</td>
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<td>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</td>
<td>In-class exercises, quizzes, laboratory assignments, and final exam</td>
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<td>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</td>
<td>In-class exercises, homework assignments, and final exam</td>
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<td>Explain the importance of appropriate patient restraint when performing radiographic studies; identify normal radiographic anatomy; and demonstrate proper positioning techniques for various radiographic studies</td>
<td>In-class exercises, homework assignments, quizzes, laboratory assignments, laboratory practical exam, and final exam</td>
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<td>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</td>
<td>In-class exercises, homework assignments, quizzes, laboratory assignments, and final exam</td>
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### 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)

VI. REQUIRED MATERIALS

   Appropriate Laboratory Attire (Scrubs)

VII. SUPPLEMENTAL REFERENCES
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. **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.