Bergen Community College
Veterinary Technology Program

Course Title:	Diagnostic Imaging
Course Number:	VET-207
Division:	Health Professions
Department:	Veterinary Technology
Credits:	3
Lecture Hours:	2
Laboratory Hours:	3
Prerequisites:	Admission into the professional segment of the Veterinary Technology Program; Vet 102, Vet 103, Vet 215

Course Description:

This course is designed as an introduction to basic radiology, ultrasound and other related diagnostic modalities. The student will learn how to correctly position an animal patient, calculate exposure values, expose radiographic film, and process radiographs of diagnostic quality for the veterinarian to examine. Special emphasis is placed on the potential hazards of radiation and occupational safety. Laboratory experiences provide practice in radiographic technique.

Course Goals:

Upon completion of this course, the student should receive a foundation in:

- Following recommended radiation safety measures
- Preparation and use of radiographic technique charts
- Correct positioning of small, large and exotic animals for routine radiographs
- Positioning techniques for specialty diagnostic radiographs, including those for the diagnosis of canine hip dysplasia (OFA)
- Radiographic processing and darkroom techniques
- The importance of proper equipment care, both for safety and quality control
- Use of both stationary and portable radiographic equipment
- Various contrast media studies
- Ultrasonography and other related diagnostic modalities, and their application to veterinary medicine

Student Learning Objectives:

Upon completion of this course, the student should be able to:

- Define x-rays and explain how they are generated
- Explain the anatomy of the x-ray machine and describe how radiography works
- Explain the hazards of ionizing radiation and list the tissues most sensitive to radiation-induced damage
- Define maximum permissible dose and describe the types of personnel monitoring devices in use
- Explain the practical methods that personnel can employ to reduce personal exposure during radiography and describe proper care of the safety equipment used
- Explain the importance of collimation
- State the variables that control the quality and quantity of an x-ray beam, and define their roles in the production of x-rays
- Define and use Santes' rule to calculate kVp
- Calculate mA or mAs, given an exposure time
- Understand the principle of the inverse square law
- Define radiographic density, contrast, radiographic contrast, subject contrast, and scatter radiation
- List and describe the exposure factors that affect radiographic contrast and density
- Describe a grid, its purpose in radiography, the various grid types and the variables that contribute to grid efficiency
- List and describe the factors that affect radiographic detail
- Identify and describe a cassette, and state its proper care
- List the properties that determine efficiency of a screen and explain the factors that govern screen speed
- Correctly mount a screen inside a cassette, and implement proper screen care
- List the two general categories of x-ray film, describe their composition and purpose, and discuss proper film care
- Describe the qualities of a good darkroom
- Describe and implement the basic steps of film processing
- Describe how an automatic processor works and understand its basic maintenance procedures
- State the importance of proper film identification, perform several methods of identification, and state the recommended criteria for filing radiographs
- Recognize potential causes of poor quality radiographs, and describe how to remedy the problem
- State the purpose of a technique chart, explain the procedure for its formulation, and describe the modifications necessary when a chart fails to produce adequate radiographic density
- Define quality control, perform selected tests used to assess it and how to interpret the results

- Identify common radiographic artifacts encountered, and state preventive measures used to eliminate them
- Define the proper anatomic positional terminology used in veterinary radiography
- Describe the proper handling of the patient for radiography, including technical preparation, basic guidelines for positioning, and the various restraint and positioning aids that are available
- Describe and/or perform the proper radiographic positioning techniques for selected anatomic areas of small, large, and exotic animals
- Properly use both stationary and portable x-ray machines
- Define the OFA and position the canine patient, according to its standards
- List and describe the common special procedures involving contrast media that are used in small animal radiography
- State the basic principles of ultrasonography, and other imaging techniques

Course Materials:

Primary (required):

Han, Connie M & Hurd, Cheryl D: *Practical Diagnostic Imaging for the Veterinary Technician, 3rd* Edition; St. Louis, Missouri, 2005, Elsevier-Mosby

Bassert, Joanna M & Thomas, John A: *McCurnin's Clinical Textbook for Veterinary Technicians, 8th* Edition; St Louis, Missouri, 2014, Elsevier-Saunders

Suggested reading resources (not required):

Brown & Brown: *Lavin's Radiography in Veterinary Technology, 5th* Edition; Philadelphia, Pennsylvania, 2014, Saunders-Elsevier

Pasquini & Spurgeon: *Anatomy of Domestic Animals*, 9th Edition; Pilot Point, Texas, 1997, Sudz Publishing

Teaching Methodologies:

In the lecture portion of the course, we will utilize textbooks and other written materials, including articles, videos, web links, and power point lectures with accompanying lecture outlines as resources to gain a basic understanding of the fundamentals of diagnostic imaging. Assignments, discussion forums, quizzes, and other online activities will be utilized to further enhance the learning objectives in this course. All resources and activities will be accessible in Moodle, with the exception of the examinations. Students will be required to come to campus to take examinations. The laboratory portion of the course will include practical "hands-on" laboratories, log maintenance, review of individual case studies, and student participation through brainstorming and critical

thinking. Laboratory sessions will be held at Bergen Community College, and as time and availability permits, sites off-campus, including privately owned veterinary hospitals/referral institutions.

Course Website:

Vet 207 is a hybridized course. The lecture component is partially online. The laboratory portion of the course requires (mandatory) weekly attendance on campus. The class has its own website, and each member of the class has an account for the website. The BCC online course management system is known as "Moodle." To enter go to: www.bergen.edu and use the quick links dropdown box in the upper right and select "Moodle." Enter your username and password. You must log into your course using the following guidelines for your username and password. ***This is the only way you can enter your course – do not change your username or password or you will not be able to log in.***

- Your **username** is the same username as your Webadvisor username. If you are uncertain of your username, go to http://go.bergen.edu, click on Webadvisor for Students, then click on "What's my ID?" and follow the prompts.

- Your **password** will be up to the first 8 letters of your last name and the last 4 digits of your Social Security Number – up to 12 characters - (no hyphens, capital letters, spaces or apostrophes)
  Example: John **O'Shaughnessy** & SS# 107-35-**1234** = **oshaughn1234**

Unless you are on campus, you are responsible for providing your own Internet access and email account throughout the course. Please refer to the "Technical Requirements" at: http://www.bergen.edu/pages/482.asp**.**

Important Troubleshooting Information

1. If you are unable to access some parts of your course, check your Browser from the "Check Browser" link on the login page and follow the instructions.
2. A frequently reported issue with login to Moodle is the use of pop-up blockers and firewalls. You must adjust both of these to "trust content" from our WebCT website: http://dl.bergen.edu – for a step-by-step document on how to adjust your Internet Explorer pop-up blocker options, please go to the Student Support Page, linked on the Moodle login page, or go directly to http://www.bergen.edu/pages/523.asp. If you need assistance with adjusting your firewall, please contact either your Internet Service Provider (ISP) or the provider of your firewall software/hardware. **If you still cannot login to Moodle, please call the 24/7 Helpdesk, toll free at 1-877-612-5381**. You may also fill in the *Moodle Help Desk Form.*

Online Lecture Communication Policy:

I will be available for general questions or inquiries via Bergen eMail List. My eMail address is crockafellow@bergen.edu. My address is also located in Topic 0 on Moodle. You may expect a reply generally within 48 hours, though it may take longer on the weekends. If you would like to speak to me face-to-face, you can attend one of my campus office hours which are listed on the last page of this syllabus under Contact Information and also in Topic 0 on Moodle, and again on my office door, Room S-336A.

Feedback will be provided generally within one week of an assignment. Grades for all assignments will be posted on Moodle located in the left hand column of the screen.

Activities and assignments will include a due date—no assignments will be available after the posted closing time. Online assignment feedback will be generated after the posted closing time through the following week.

See online communication policy on the top of the web page for additional communication options. All communication in this course will be written using proper grammar (i.e. complete sentences; no abbreviations please). Be courteous when participating in discussion forums and be respectful of others' postings, opinions, and questions.

Lecture Participation Policy:

Students will be expected to actively participate in an online learning community throughout the course. The program requires that participants:

- Complete assigned readings in a timely fashion
- Attend in-class lectures when applicable
- Post, read, and reply to comments in the discussion forums
- Complete online quizzes and assignments by the due date (they will not be available after the closing date and time indicated!)
- Submit written assignments by the due date when applicable (they will not be available after the closing date and time indicated)
- Take exams on campus at dates, times, and location indicated

Lecture Exams:

There will be two written unit exams given at times selected and announced in advance by the instructor. Exams will be given in an assigned computer room. Exams will cover lecture material and other resources available on Moodle (e.g. assignments, clinical case discussions, handouts, articles, web resources, and assigned readings). Exams will be given in a combination multiple choice, identification, and applied clinical case

(radiographic) format. Students are expected to take exams as scheduled. Failure to attend a scheduled examination requires the student to contact the instructor within 72 hours of the scheduled exam date AND provide a written bona fide excuse for the absence. Upon demonstration of a verifiable absence (i.e. medical, family emergency, unavoidable travel, emergency auto repair, police, or court documentation), the instructor may provide a make-up exam, which will be given in a format of the instructor's choice and administered in the testing center on a date specified by the instructor. Failure to contact the instructor within this given time frame will result in a grade of 0 for that exam. The student should allocate sufficient time to get to an examination on time. If a student is late on the day of the examination, the student will be allowed to take the exam, however, no additional time will be allotted for completion of the examination.

Online Quizzes:

There will be weekly on-line quizzes posted on Moodle, with opening and closing dates posted on the site. Each week's quiz will open directly after the lecture period (3:45pm) and will close the following week just prior to the lecture period (1:45pm), unless otherwise indicated. The content of the quiz will relate to the lecture & reading assignment given that week. You are expected to complete the work individually (please read section on academic integrity). If you do not complete the quiz by the closing date, you will receive a zero (0) for that week. Quiz grades will be averaged to provide 15% of the lecture grade. If you are having difficulty accessing Moodle, consult the student help desk. There are several computer labs on campus that are available for student use.

Case Study Assignment

You will be assigned a clinical case study at the beginning of the semester. You will assemble in a small group and work together to investigate the case. A due date will be assigned and posted on Moodle. Your group will provide a written case workup to be handed in to the professor the day of the presentation, and additionally, you will give a summarized group presentation on your case in class. A grade will be given, which will be based upon the following criteria: 2 points for preparedness, 3 points for organization, 4 points for clarity of presentation, 6 points for communicating information relevant to the case, 10 points for accuracy. The case study assignment will provide 5% of the lecture grade.

Other Assignments

Other assignments for lecture will be posted in Moodle.

Grading Policy Lecture & Laboratory:

Lecture grades will be averaged for 50% of the final course grade:

Online quizzes & other assignments	15%
Case study group project	5%
Exam #1	15%
Exam #2	15%

*IMPORTANT NOTE: The student must obtain an overall minimum final grade of 76% to successfully pass the lecture portion course (independent of the laboratory grade).

See Laboratory Information Sheet, which will be provided by the laboratory instructor. Lab grades will be averaged to provide 50% of the final course grade. The student must achieve a minimum final grade of 80% to pass the lab portion (independent of the lecture grade).

Veterinary Technology Program Grading System:

91-100 = A
88-90 = B+
83-87 = B
80-82 = C+
78-79 = C
<78 = F

Clinical Competency Evaluations:

In addition to the regular coursework required, students will complete clinical competencies for a list of essential skills associated with the course topic, as dictated by the AVMA accrediting body. Students will work individually (or in groups where indicated) to achieve a satisfactory competence level necessary for each required skill.

Students must perform ALL the essential skills required in this course. The student will be given the opportunity to complete these skills during regular class time. All skills performed during the semester will be evaluated by the instructor, who will provide a signature after the successful completion of a task. A list of skill sets will be available (by appointment) in the Veterinary Technology building for ongoing review

If any essential skill is not completed successfully after the first scheduled attempt, the student and instructor will meet to discuss and make arrangements for a second opportunity. If clinical competency remains unsatisfactory after two attempts, the student, instructor, and program director will meet to discuss further options for successful completion of the course.

Lecture Outlines:

Outlines are designed to supplement the lecture power point series (their use is optional).

Lecture Attendance Policy:

As this course is partially hybridized, most of the learning experience will be in an online format. However, there are times when the students will be required to attend lectures on campus. The dates for required attendance are listed in Moodle and also in this syllabus. Attendance will be recorded when applicable. It is the student's responsibility to sign in during the class to receive credit for attendance. Whether you are late or absent for a particular class, you are responsible for all material covered in your absence—this material may be obtained from a classmate. Missing >3 lecture sessions (lateness >20 minutes will count as ½ absence) for any reason will result in failure for the course. You will be referred to the program director in the event this should happen to discuss your standing in the program. If you are late for a lecture session, please enter the classroom quietly and without interruptions. You can contact the lecturer at the break or after lecture for any handouts, sign in, or announcements you may have missed.

Laboratory Attendance Policy:

See Laboratory Information Sheet

Student Accommodations:

Students who require accommodations by the Americans with Disabilities Act (ADA) can request support services from the Office of Specialized Services of Bergen Community College, Room L-116, Pitkin Education Center, 201-612-5270 or www.oss@bergen.edu. Deadline for accommodations is posted at this site.

Rules and Regulations Governing Conduct

Each student is expected to obtain a copy of the Bergen Community Student Handbook and is responsible for knowing the information included in the Handbook. Copies are available in the Office of Student Life, the Welcome Center, evening office, and on the Bergen Web site.

In addition, each student accepted in the Veterinary Technology Program is expected to obtain a copy of the Veterinary Technology Student Handbook and is responsible for knowing the information included in this Handbook. Copies are available through the program director.

All students and faculty are governed by college rules and regulations. Please refer to the Student Handbook for information regarding codes of conduct.

Academic Integrity

Bergen Community College is committed to academic integrity. Please refer to the current Student Handbooks for details related to academic integrity/discipline.

Lecture Contact Information:

Dr. Cynthia Rockafellow
Office #S-336 A
Phone: 201-493-5016
Bergen E-mail address: crockafellow@bergen.edu

OFFICE HOURS:

Tuesdays: 12:30-1:30pm (S-336A)
Wednesdays & Thursdays: 12:30-1:30pm (Veterinary Technology building)
Or by appointment (please contact me by phone or e-mail at least 72 hours in advance of appointment)

Laboratory Contact Information:

To be announced

RELEVANT PROGRAM INFORMATION:

- Division of Health Professions
  Veterinary Technology Department
  400 Paramus Road
  Paramus, NJ 07652-1595
- Dean of Health Professions: Dr. Susan Barnard
- Health Professions Secretary: Mrs. Gerri Farrell
- Health Professions Fax # 201-612-3876
- Veterinary Technology office (program director): 201-612-5389

Vet 207 Course Outline & Schedule*

Semester Offered: Fall 2014
Lectures meet on Tuesdays 1:45pm-3:40pm (when applicable)
Lab sections meet in the Veterinary Technology building (unless otherwise indicated)

	DATES	LECTURE	ON-CAMPUS ATTENDANCE DATES (required)
TOPIC 1	9/2-9/9	Electromagnetic Radiation & X-rays (quiz opens 9/2; closes 9/9)	9/2/14
TOPIC 2	9/9-9/16	Radiation Safety (opens 9/9; closes 9/16)	
TOPIC 3	9/16-9/30	Diagnostic X-ray Production (quizzes open 9/16; close 9/30) (test yourself questions due 9/23)	
TOPIC 4	9/30-10/7	X-ray Processing (quizzes open 9/30; close 10/7)	9/30/14
TOPIC 5	10/7	**Exam #1**	10/7/14
TOPIC 6	10/7-11/11	Small Animal Positioning & Techniques (quizzes open 10/7; close 11/11) (group project due 11/11)	
TOPIC 7	11/11-11/25	Contrast Studies & Alternative Imaging Techniques (quizzes open 11/11; close 11/25) (discussion forum open 11/11; closes 11/25)	11/11/14
TOPIC 8	11/25-12/9	Large Animal & Exotics Radiography (quiz opens 11/25; closes 12/9)	
TOPIC 9	12/16	**Exam #2**	12/16/14

*lecture schedule is subject to change; lecture schedule, learning objectives, lecture topics, resources, reading assignments, quizzes/assignments with opening & closing dates also found on Moodle site

Last revised 6/14