Course Curriculum and Assignments

VETT 1014: Laboratory Procedures 2

This program is a cooperative educational effort of the American Animal Hospital Association and Cedar Valley College

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David L. Wright, D.V.M.

Educational opportunities are offered by the Dallas County Community College District without regard to race, color, age, national origin, religion, sex, disability, or sexual orientation.
I). Course Description:

Laboratory Procedures 2 is an intermediate-level veterinary technology course designed to provide information in the areas outlined in the topic schedule. Students must read the required materials, successfully complete the workbook and clinical assignments, and pass the scheduled exams to receive credit for the course.

II). Course Objectives:

This course is designed to teach and document the successful completion of the following Committee on Veterinary Technician Education and Activities (CVTEA) essential and recommended tasks.

A). Perform hematologic evaluations:

1. Perform CBC
2. Perform reticulocyte count
3. Perform platelet count
4. Calculate hematological indices
5. Identify blood parasites
6. Perform a coagulation evaluation test

B). Perform parasitologic procedures:

7. Collect samples
8. Test for external parasites
9. Test for internal parasites

C). Identify common adult parasites and their ova, and apply knowledge of common parasite life cycles.

III). DEVTP Program Information:

Program Phone: 1-877-353-3482
Office Hours: 8:00 AM to 5:00 PM Monday - Friday (Central Time Zone)
Program Fax: 1-972-860-8057
Information: http://ollie.dcccd.edu/vettech
Mailing Address: Cedar Valley College
DEVTP Program
3030 N. Dallas Avenue
Lancaster, TX 75134
IV). Course Instructor:

David L. Wright, D.V.M.

Instructor Email: DLW3505@dcccd.edu
Instructor Phone: 1-877-353-3482

V). Course Materials:

A). Laboratory Procedures for Veterinary Technicians by Charles M. Hendrix, DVM, PhD, 4th edition, Mosby


D). Course Workbook

E). A medical dictionary such as Stedman’s Illustrated Medical Dictionary, Dorland’s Illustrated Medical Dictionary, or Saunders Comprehensive Veterinary Dictionary

VI). Clinical Preceptors:

Preceptors are extremely important to your success in the course. Being a preceptor is a position that requires time, commitment, and dedication. In most cases it is advantageous for students to have multiple preceptors, each with an interest in a specific area. In some practices, only one or two people may qualify to serve as a preceptor. However, in other practices, many individuals may be qualified to serve in this capacity. Multiple preceptors will decrease the burden on any one person in the practice in his or her preceptor responsibilities and assist the student in the completion of assignments and examinations. Each student is required to have at least one qualified preceptor for the course or courses for which they are enrolled. All preceptors must meet the minimum requirements for preceptor approval. Each preceptor must be a graduate D.V.M. or V.M.D., a graduate of an AVMA/CVTEA-accredited program of veterinary technology, or a person credentialed as an RVT, LVT, or CVT. Preceptors must always directly witness, participate in, or personally initial check-off sheets for assignments for the student to receive credit. Preceptors should never sign on weekly assignment lists or any other document without directly meeting these requirements. Preceptors are required to complete, monitor, and maintain Off Campus Clinical Instruction (OCCI) Standards.
Individual applications must be submitted and approval granted for each preceptor. New preceptors may be added at any time. To add a new preceptor, just contact the program office and we will fax or mail you an additional preceptor form.

VII). Student Code of Conduct:

Students in distance education courses are expected to follow the rules and policies stated in the student code of conduct in the Cedar Valley College and D.C.C.C. catalog. Failure to follow these rules may result in disciplinary action by the instructor and/or the college.

VIII). Important Information:

This course is an intermediate-level veterinary technology course. As such, you may be required by the assignments in this workbook to perform tasks reserved by law or statute for credentialed veterinary technicians. It is imperative that you follow the requirements of your locality regarding the tasks assigned in this workbook. You should follow the assignment schedule in the course workbook, and NOT use your enrollment in the DEVTP as a means of circumventing local laws or regulations. If laws disallow you from performing a given procedure, your preceptor should note that on the preceptor checklist. Points will not be deducted if a procedure is not performed because of legal constraints. Neither Cedar Valley College nor the American Animal Hospital Association advocate students performing tasks not legally allowable for non-credentialed individuals. However, as a student in DEVTP courses you may have certain rights as a student depending on your locality.

Please check your state or provincial regulations carefully and always follow them.
IX). Submission of Assignments:

A). All written work and required submissions should be submitted by Email directly to the specific staff member that administers that class.

B). You should submit your work ONLY to the person that administers each of your individual courses.

C). You should use your private Email account to send in all work either as a word processed document attachment, preferably in MS Word, or as a scanned attachment.

D). Please do not send in homework as the actual text of the Email.

E). The subject line of the Email should list the class and the week that you are sending. For example the subject line should read something like “VETT 1001 - Week Five”. In the body or text of the Email you must give us your name. We have no way of knowing who you are just from the Email address. You MUST give us the class, the week, and your name to receive credit for the submission.

F). The Weekly Preceptor Checklist should be signed each week by your preceptor, and then you should scan it and send it in as an Email attachment with your weekly submissions.

G). If you do your work in freehand, it must be neat, legible, and in done in dark ink. Pencil will not show up if it is scanned and then sent.

H). For more specific information on how to send work as an Email attachment and how to scan, save and send information, please see the posted directions in the “Assignments” section of your site.
X). **Student Credit and Grading:**

A). To receive a passing grade for this course students must achieve an average grade of 70 percent or greater for the course. Since the course is both clinical and didactic, students should complete the written and clinical assignments and the tests with a grade of 70 percent or better. Examination and assignment grades will be available to students through the BlackBoard Course Information system. Students should check the “Check Grade” section of “Student Tools” in BlackBoard daily to ensure that assignments and exams have been received and posted. Assignment grades should be posted by the Monday following the assignments due date. At peak submission times there may be an additional 24- to 48-hour delay in posting grades. All earned points will be added together and divided by the number of total possible points to determine the final course grade as a percentage. This percentage grade will be mailed to students at the end of the course. Grades will be posted on each student’s official college transcript as CP (Credit Passing) or as CF (Course Failure). If students wish to be eligible to convert courses to college credit at a later date, a 70 percent score (CP) will be required for each course, and the student must meet applicable Off-Campus Clinical Instruction requirements. Students may finish and submit assignments ahead of the workbook schedule, but assignments and required course work must be submitted by the end of the week that they are due or the submissions are subject to the point penalty described in part D. below. Students are very strongly encouraged to work at the pace set in the workbook to achieve the maximum benefit and learning from the course. Final course grades and a certificate will be mailed to students at the end of the term after final grades are calculated.

B). Final numerical grades will be based on the following scale: 90% or greater of the total points = A, 89% to 80% = B, 79% to 70% = C, and below 70% = F.

C). Emails will be sent directly to you with specific information on any corrections to your submitted work. If you receive a perfect score, we will post the grade and will not send back your assignments. If we do have corrections or comments on your assignments we will put those in the form of an email and send that to you as soon as possible after grading your work. It is therefore essential that you enter your email address in your course site and that it is visible in the “Roster” section in each and every one of your course sites. You will need to check your class grades and email messages daily. This procedure will insure that you will have corrected assignments and feedback as soon as possible to use to in studying for your exams. Often corrected work can be in the mail when you need it the most as a study resource. The email that we send you will list the name of the class, which assignment it is, which question it is, and the correct answer or comments on your submission. This will allow you to get better feedback, much more quickly. If you wish to receive your paper copies back in the mail, just send then to us by U.S. mail and include a stamped, self-addressed envelope, and once your assignments are graded we will mail
them back to you in the return envelope. If you choose to submit your work by U.S. mail, the required work **MUST** be received by the date the work is due, not the post mark date. This will insure that assignments and submissions are received, graded and returned in a timely manner.

**D). Please Note:** Points will be deducted for persistently late or tardy submission of assignments and required course work. A 25% point-loss, per week, penalty will be assessed for persistently late work. If you are going to be more than a week late in submitting your course work, you should contact the person that administers your class in writing or by email, let them know what the situation or problems is, and request an extension. To keep good records and to insure that everyone is clear on your expectations, all requests **MUST** be made by email or in writing. There is too much chance of miscommunication or confusion if the situation is handled strictly on the phone. If we are in contact with you and know what is happening, we can make suitable arrangements to accept late work without penalty. Work submitted late, without prior approval is subject to the tardy submission penalty stated above. If students have not submitted enough assignments and completed enough exams to maintain a passing average by Unit Six, they and their preceptors will be sent a letter of Administrative Withdrawal (AW) by the program.

**E). In level 3 classes that require a video submission (General Hospital 3, Exam Procedures 3, and Surgical Procedures 3), the required videos must be submitted and received no later than the end of week 10. In all classes, including those, all written and clinical assignments, including course task checklists, are due at the end of week 11 of the course. The last week of classes, week 12, is to be utilized strictly as "finals week" and students should use that period to complete final written exams in their course(s). Written assignments, clinical assignments, and course task checklists received after the end of the 11th week will be subject to the same point penalties as any other assignment. It is important that you complete all your submissions, except for final on-line exams, before the end of the week 11.**

**F). From time to time students may request an extension beyond the end course date. Extensions may only be granted for reasons of personal illness or injury, close family member illness or injury, or the death of an immediate family. To receive an extension beyond the end term date, students must provide proper documentation of their illness or injury, their immediate family members illness or injury, or the death in the family. In the case of illness or injury this will require a specific signed letter from a physician. In the case of a death in family a published death notice or suitable external documentation will be sufficient. In both cases students must also provide a signed letter from an approved preceptor or a practice manager stating that the circumstances for the requested extension were sufficient to require that the student was not able to accomplish a specific number of days assignments. End of course extensions will be commensurate with the time that the student was unable to complete required course work. If you were out sick a week, it is appropriate to grant a weeks extension, and so on. If there are any other requests for extension they should be directed to both the course instructor and the course
administrator. Requests for end of term extensions other than injury, illness or a death in the family will be handled on a case by case basis. The final decision to grant end of course extensions will rest with the course instructor.

G). You will have on-line exams in this class. The exam will be posted one week before the actual exam week, and will remain available until one week past the assigned exam week. At the end of the third week that the exam was posted it will be made unavailable and may not be taken after that date without the specific approval of the course instructor. Approved excuses to take the exam after it has been made unavailable include documented personal injury or illness, close family member injury or illness, or a death in the family. (See F. above)

H). If students feel that they have received an unfair evaluation on an assignment or exam, they should contact the instructor to resolve the situation. If a student wishes to appeal the decision of the instructor, the student should contact the Veterinary Technology Program Director.
XI). Specific Point Values for Assignments and Examinations:

<table>
<thead>
<tr>
<th>Week</th>
<th>Assignment</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>On-Line Assignments</td>
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<td>Weekly Tutorial Points</td>
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<td>Part One OSHA Exam</td>
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<td>1</td>
<td>Preceptor Checklist</td>
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<td>Preceptor Checklist</td>
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<td>4</td>
<td>Preceptor Checklist</td>
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<td>5</td>
<td>Preceptor Checklist</td>
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<tr>
<td>6</td>
<td>Preceptor Checklist</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Preceptor Checklist</td>
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<td>Examination One</td>
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</tr>
<tr>
<td>12</td>
<td>Preceptor Checklist</td>
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<tr>
<td></td>
<td>Examination Two</td>
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<td>Course Task Checklist</td>
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<td></td>
<td>Total Points Possible</td>
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Grading Scale:

- 680 to 612 points = A
- 611 to 544 points = B
- 543 to 476 points = C
- 475 and below points = F
XII). Course Assignment Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Hendrix</th>
<th>Sloss</th>
<th>Tortora/ Derrickson</th>
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<tbody>
<tr>
<td>1</td>
<td>The Cardiovascular System: Blood; Introduction to the Laboratory; CBCs, RBCs, WBCs, &amp; Anemias</td>
<td>pp. 1-28, 29-38</td>
<td></td>
<td>pp. 666 - 694</td>
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<tr>
<td></td>
<td>Laboratory Equipment</td>
<td></td>
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<td></td>
<td>Clinical Procedures</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>WBC Counts and Differentials; Platelets, Plasma Proteins, and Clotting Time</td>
<td>pp. 48-58</td>
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<td></td>
<td>Clinical Procedures</td>
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<tr>
<td>4</td>
<td>Case Examples; Transfusions; Introduction to Parasitology</td>
<td>pp. 67-74, 294-313</td>
<td>pp. 3-16</td>
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<td>Clinical Assignment</td>
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<td>5</td>
<td>Small Animal Parasitology</td>
<td>pp. 257-279</td>
<td>pp. 17-44</td>
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<td>6</td>
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<td>p. 279</td>
<td>pp. 79-92</td>
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<td>Exam One</td>
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<td>8</td>
<td>Large Animal Parasitology</td>
<td>pp. 280-286</td>
<td>pp. 46-61</td>
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<td>Large Animal Parasitology</td>
<td>pp. 286-293</td>
<td>pp. 63-78</td>
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<td>Clinical Procedures</td>
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<td>10</td>
<td>External Parasites</td>
<td>pp. 323-342</td>
<td>pp. 121-136</td>
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<td>External Parasites</td>
<td>pp. 342-364</td>
<td>pp. 136-175</td>
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<tr>
<td>12</td>
<td>Exam Two</td>
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</tbody>
</table>

XIII). When Your Assignments are Due:

Specific information on the specific dates and times that assignments are due is posted on your course web site in the "Assignments" section. Please consult it and follow the assignment and exam schedule that is posted there.

XIV). OSHA

The OSHA training exam is posted on your course site. You must complete the exam by the end of Week Four with a 70% or greater score to receive credit for his course. Even if you have received a passing grade on this exam in a previous course, you are required to complete and pass the OSHA exam posted on the course web site in each subsequent class. The exam is worth 10 points in all upper level classes. Regardless of the number of points that you have, you MUST take and make a score of 70% or greater on this exam to receive credit for this course.

XV). Academic Honesty:

Strict academic honesty is expected, and personal and professional integrity is valued in the Dallas County Community Colleges. Scholastic dishonesty is a violation of the Code of Student Conduct. Scholastic dishonesty includes, but is not limited to, cheating on a test, plagiarism, falsifying documents, forgery, and collusion. As a college student, you are considered a responsible adult. Your enrollment indicates acceptance of the DCCCD Code of Student Conduct published in the DCCCD Catalog. More information is available at https://www1.dcccd.edu/cat0406/ss/code.cfm.
I). Overview:

It is important to review the assignments for each unit, especially for Unit One. As in previous courses, schedule your time wisely and appropriately, and pay special attention to the assignment schedule. Assignments should be completed according to the schedule listed in the syllabus and in the workbook to receive full credit and benefit for each class or assignment. All assignments more than one week (7 days) late may be assessed a 25% penalty for each week late. The course officially closes 7 days after the last assignment due date. Any submissions received after that date will NOT be accepted. You are strongly encouraged to schedule an appointment with your preceptor and review both the student assignments for the course as well as the duties and responsibilities of the preceptor.

You should first review the materials for the week's class and then schedule your clinical and study time to accomplish the tasks and assignments with your preceptor. A specific time should be scheduled with your preceptor for clinical assignments.

Examinations should be completed by the scheduled date. It is the responsibility of you and your preceptor to ensure that exams are completed at the appropriate time.

II). What's New in Upper Level Courses?

Level Two and Level Three courses are intended for intermediate to upper level veterinary technician students. These courses are the foundation for the Cedar Valley College Distance Education Veterinary Technology Program (DEVTP). In order to apply for and maintain AVMA/CVTEA accreditation of the DEVTP, Cedar Valley College is required to document that certain tasks are completed by each student with a minimum level of proficiency. In order to accomplish this, we have posted your Course Task Checklist on your course web site in the “Assignments” section.

The Course Task Checklist contains a group of required tasks that must be completed by the end of the eleventh week of the course. You should familiarize yourself with each of the required tasks on this list. If the opportunity arises during the course of your normal duties, you may complete a task when it is convenient rather than at a time specified in the workbook. We realize that not all tasks might not be able to be accomplished based on a specified period in the workbook because of varying caseloads in clinical practice. As such, you are required to complete the tasks during the first 11 weeks of the course, but not necessarily during a specified unit period. When a task is completed, the preceptor should date and initial the appropriate area on the Course Task Checklist located at the back of this workbook.
The course task checklists meet the AVMA/CVTEA requirement that states, "10e. The program must provide documentation of standard criteria for evaluating completion of all essential tasks. These criteria must be consistent with standards that reflect contemporary veterinary practice. The Veterinary Technology Student Essential and Recommended Skills List is provided in Appendix J." Further in a letter to all AVMA/CVTEA accredited programs it is stated "The Curriculum Standard 10e states, "The program must provide documentation of standard criteria for evaluating completion of all essential tasks." This means that you must develop criteria for evaluating successful completion for each skill. The concept is that you must have a system for assessing satisfactory acquisition of skills beyond "yes or no". You are not being asked to standardize teaching methods; only evaluation methods. To do so will require identifying the steps involved in successful completion for each skill. This will admittedly be an onerous task, but one that the Committee unapologetically feels is appropriate." To meet this requirement the course task checklist has been expanded to include specific step-by-step details on a specific method the DEVTP program believes that each task should be performed according to defined procedures in textbooks and a set of quantitative listings of performance have been included as well. The list of steps for each task is intended to assist students and preceptors in insuring that all steps in an required or recommended task are accomplished and that noting "falls through the cracks" in any given task or assignments. The task list should be viewed as a positive step in insuring the technical competence of DEVTP students, not as a restrictive or proscriptive mandate by the DEVTP program or the AVMA. The purpose of the "10e" requirement is to assist with clinical competencies and to insure that veterinary technology programs, preceptors, and students are clear in what is expected in the hands-on portions of their courses.

At the end of the eleventh week of the course or when all tasks have been successfully completed, the Course Task Checklist should be signed by you and your preceptor and then submitted to the course administrator. If performance of a task is in violation of local statutes or laws, the preceptor should make a notation to that effect on the preceptor list. ALWAYS follow your local regulations.
I). Required On-Line Assignments:

During this, and most of your other courses, you will have specific and required on-line assignments or classes. At the first of every term, you should open the "Course Documents" section of your course site and note the on-line assignments for this class. Very early in your class, determine which on-line assignments we will be doing, print off the instructions, and explore and become familiar with the sites and areas that you will be using.

II). Unit Tutorials:

In your course web site there are Unit Tutorials posted. These tutorials are designed to enhance your learning experience in this class and to provide Internet based resources to supplement and compliment your texts and any required videos. You should review each unit's tutorial each week, and read through any supplemental web sites and complete any weekly self tests or other exercises. The Unit Tutorials can be a valuable and interesting learning tool.

III). Reading Assignments:

A). *Principles of Anatomy and Physiology* by Tortora and Derrickson
Pages 666 - 694

B). *Laboratory Procedures for Veterinary Technicians* by Charles M. Hendrix
Pages 1-28 and 29-38

IV). Overview of Unit One:

A). This is the introductory week to the course. You should take extra time to familiarize yourself with the texts and assignments that are required to complete this unit's work. It is essential that you stay on schedule and complete all assignments on time. One of the purposes of the Lab Procedures 2 course is to assist you in gaining the information and skills necessary to function as a technician in a veterinary hospital. As such, you should be aware of several things. First, not all answers will be expressly stated in the reading for each assignment. In many cases, the structures, tasks, and answers may have to be found by combining the information from several texts, including a medical dictionary. It is this research and exploration methodology that will encourage you to learn independently and develop skills that will be used in other courses and in the daily tasks of a veterinary practice.
B). Second, the physiology text used in this course is a human-based publication. The faculty at Cedar Valley College (CVC) is of the opinion that a suitable veterinary-based text at this academic level is not currently available. The instructor has used a similar text by the same author for more than 25 years for the CVC in-residence veterinary technology courses. That text has given students an excellent anatomical and physiological background. Despite the anatomical and occasional physiological differences between humans and animals, this text has the capacity to serve as a very sound and excellent source of information in the areas to be studied. This text is richly illustrated, highly readable, and medically oriented. If a veterinary text of equal or better quality is published, then a textbook change will be made. Until then, in the professional opinion of the instructor, this is the best text available to meet the course goals at this level.

C). This course will also have a large animal component. You will not be required to perform hands-on tasks with large animals, but it would be desirable to have access to large animal blood for hematology practice, and it will be essential to have access to large animal fecal samples for clinical assignments. Horse and cattle fecal samples will be required, and it would be beneficial to have swine, sheep, and goat samples as well.

D). The final course in Laboratory Procedures will reinforce existing skills in this area and continue to expand the breadth and scope of knowledge in clinical pathology and laboratory procedures. Laboratory Procedures 3 is considered a capstone course, and all material presented in Laboratory Procedures 2 is considered relevant to it. You should anticipate material from Lab Procedures 2 being on any, or all, Laboratory Procedures 3 exams. There is, in addition, a final comprehensive practical exam at the end of Laboratory Procedures 3 that MUST be successfully completed in an approved testing facility to receive credit for the Laboratory Procedures courses. Specific information on this capstone exam will be available in the Laboratory Procedures 3 course syllabus.
V). Unit One Objectives and Assignments:

A). Study and define the basic principles and terms of hematology.

B). Describe the properties and components of blood.

C). Describe the care and proper use of microscopes, centrifuges, refractometers, and electronic blood cell counters.

D). Become familiar with rules, procedures, and requirements of the course.

E). Familiarize yourself with the On-Line requirements of the course and prepare to participate in the required assignments.

F). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.

G). All Unit One required submissions are due to the course administrator and must be received by the Monday following the first week of the course. They must be accompanied by the signed preceptor checklist for the first unit of the course.

VI). Assignment One:

Read the information in Principles of Anatomy and Physiology, by Tortora and Derrickson, answer the Self Quiz and Critical thinking questions at the end of the chapter and complete the self-test questions on the material on the course web site.

VII). Assignment Two:

Based on the reading in the Hendrix text, pages 1-28 and 29-38, answer the following questions. You are required to show your answers to your preceptor for confirmation of assignment completion.

1. Circle the following that are essential criteria for clinical laboratories in veterinary hospitals.
   a. Electrical outlets for machines
   b. Storage space for materials and supplies
   c. Suitable space for food and drinks while working
   d. A sink and running water
   e. A specific dedicated area for laboratory work
   f. A radio or television for pleasant diversions while doing boring lab work
g. All the statements are true.

2. Circle the following that are correct statements concerning electronic blood cell counters.
   a. An impedance counter counts cells by measuring the cell’s ability to alter electronic resistance as the cells pass through a small aperture.
   b. Darkfield illumination counters measure cell numbers by detecting light diffraction as a cell passes through a light beam.
   c. Multifunctional instruments combine either impedance or darkfield illumination counters with photometric capability to determine hemoglobin concentration.
   d. As a general rule, electronic cell counters provide a fast, reliable, and accurate measurement of blood cells.
   e. Electronic cell counters may have problems due to improper operation, quality control, and electrical and mechanical malfunctions.
   f. When leukocyte counts or platelet counts are performed, water must be added to the blood to produce a diluted solution for the cell counter.
   g. Electronic blood cell counters are sophisticated and delicate instruments and the manufacturer’s recommendations on daily cleaning, maintenance, and quality control should be exactly and carefully followed.
   h. All the statements are true.

3. Circle the following statements concerning quality control that are true.
   a. One of the most important job responsibilities of any veterinary technician is ensuring quality control in all aspects of the practice.
   b. Control serum consists of a single, precise sample of freeze-dried serum from dogs or cats that must be thawed and rehydrated before use.
   c. Assayed control serum has been analyzed just once using a precise machine to determine the circulating level of a single major blood constituent.
   d. Control serum may be obtained from the serum of several healthy animals from your own hospital.
   e. A blank sample contains all the reagents used in the assay of blood parameters, except for the patient specimen.
   f. A standard is a solution containing an unknown amount of a body constituent that must be analyzed to obtain a body normal value.
   g. All the statements are true.
   h. None of the statements are true.

4. Circle the true statements concerning laboratory records.
a. Internal records are those in which the laboratory logs assay results and the methods by which the results are obtained.
b. Quality-control records are essential; they document the reliability of assay results and identify results that may be inaccurate.
c. External records are those by which laboratory personnel communicate with people throughout the veterinary practice and in other laboratories.
d. There should be complete information recorded on all samples being shipped to laboratories, samples analyzed in the practice, or data entered into the patient’s chart.
e. All the statements are true.
f. None of the statements are true.

5. Indicate which of the following would **NOT** be a part of a complete blood cell count.
   
   a. Differential leukocyte count
   b. Plasma protein concentration
   c. Erythrocyte morphology
   d. Precursor determination
   e. Erythrocytic indices
   f. Hemoglobin concentration
   g. Serum osmolality
   h. Packed cell volume
   i. Total leukocyte count
   j. Platelet estimation
   k. Thrombocyte morphology

6. Circle the true statements about the packed cell volume (PCV).
   
   a. The buffy coat layer of a PCV contains leukocytes, platelets, and nucleated erythrocytes.
   b. RBCs have the lowest specific gravity and therefore are found on the bottom of the hematocrit tube.
   c. PCVs are usually performed using microhematocrit tube and centrifuged for about 5 minutes to determine the correct value.
   d. Failure to properly plug the end of the microhematocrit tube with clay can lead to a really big mess in the centrifuge.
   e. PCVs are usually read on a hematocrit reader, and the value is usually reported as a percentage of RBCs.
f. The plasma fraction of the PCV should always be examined, and any
abnormalities in color should be reported.

g. All the statements are true.

h. None of the statements are true.

7. Circle the following true statements concerning the white blood cell count (WBC).
   a. The Unopette WBC system uses diluting reservoirs and capillary pipettes to
      prepare samples for WBC determinations.
   b. Ammonium oxalate or acetic acid is most commonly used to lyse RBCs when the
      Unopette system is being used.
   c. A hemocytometer is charged with lysed blood, a special coverslip is placed on
      the hemocytometer, and the slide is read using the procedure described in the
      text.
   d. The Unopette system is cumbersome, time consuming, and less accurate than
      blood cell counters, but can provide a suitable backup system when the
      electronic blood cell counter is not working and results are needed as quickly as
      possible.
   e. All the above are true.
   f. None of the above are true.

8. Indicate which of the following would **NOT** be determined from a blood film.
   a. Estimate of platelet numbers
   b. Estimate of erythrocyte concentration
   c. WBC morphology
   d. RBC morphology
   e. Estimate of WBC concentration
   f. Differential WBC percentages

9. Match each term with its correct definition listed below.
   _____Regenerative anemia
   _____Reticulocytes
   _____Hemolysis
   _____Macrocytic anemia
   _____Microcytic anemia
   _____Normocytic anemia
   _____Hypochromic anemia
Normochromic anemia
a. This anemia is characterized by RBCs of normal size and is secondary to a variety of chronic diseases.
b. Blood destruction
c. A transitory increase in the size of RBCs seen with regenerative anemias
d. The bone marrow responds to anemia by increasing erythrocyte production and releasing immature RBCs.
e. An anemia in which the RBCs are smaller than normal size
f. Polychromatophilic immature erythrocytes
g. An anemia in which the erythrocytes have a normal hemoglobin concentration
1) An anemia in which the RBCs have reduced hemoglobin concentration

VIII. Assignment Three:
Based on the reading in the Hendrix text, pages 3-8, complete the following assignments.

1. Be able to identify and define the following structures on a compound microscope. You may be required to identify these structures on examinations.
   a. Ocular lens system
   b. Objective lens system
   c. Optical tube length
   d. Stage
   e. Coarse focus knobs
   f. Fine focus knobs
   g. Substage condenser
   h. Iris (aperture) diaphragm
   i. Light source
   j. Field diaphragm
   k. Interpupillary adjustment
   l. Turret
   m. Stage travel knobs
   n. Eyepiece focus

2. Schedule a time with your preceptor and ensure that you understand your practice’s standard operating procedures on how to properly clean and care for your hospital’s microscope. Then, with your preceptor monitoring, demonstrate the "Microscope
Operating Procedures" found in Procedure 1-1 on page 8 of the text. Once you have successfully performed these procedures, have your preceptor date and initial the Course Task Checklist found at the end of this course workbook.

3. Be able to define and identify the following parts of a centrifuge. You may be required to identify these structures on examinations.
   a. Horizontal centrifuge head
   b. Angled centrifuge head
   c. On/off switch
   d. Timer
   e. Tachometer
   f. Braking device
   g. Hematocrit centrifuge

4. Schedule a time with your preceptor and have he or she ensure that you understand and can properly operate your hospital's centrifuge(s). Once you have successfully performed that procedure, have your preceptor date and initial the Course Task Checklist found at the end of this course workbook.

5. Schedule a time with your preceptor and ensure that you understand your practice's standard operating procedures on how to properly clean and care for your hospital's refractometer. Then, with your preceptor monitoring, demonstrate the "Refractometer Use" found in Procedure 1-2 on page 13 of the text. Once you have successfully performed the procedure, have your preceptor date and initial the Course Task Checklist found at the end of this course workbook.

6. Schedule a time with your preceptor and ensure that you understand how to properly use your hospital's electronic blood cell counter. Once your preceptor is assured that you can perform appropriate hematological procedures using the electronic cell counter, have your preceptor date and initial the Course Task Checklist found at the end of this course workbook.

If your practice does not own any of this equipment, please indicate on the Course Task Checklist. You are not excused from the requirement of performing these tasks if the practice does not own any of this equipment, and you will need to make arrangements with another practice or facility to complete the assignment(s).
IX). Assignment Four:

Familiarize yourself with the specific tasks, assignments, and testing subjects that must be accomplished during the length of this course. The Course Task Checklist is located on the course web site and must be completed and submitted in order to receive the points designated for the clinical assignments. These tasks are assigned in various weeks during the course but can be accomplished at any time during the length of the course when the opportunity arises in the normal caseload presented at the hospital.

Submission of the Course Task Checklist by the end of the eleventh week of the semester is required to receive credit for the assignments. During the first week of the course, it is strongly recommended that you review these tasks with your preceptor so that your preceptor will be aware of the tasks that must be completed during the course. As stated, this assignment is an ongoing assignment that you can complete over the length of the course, but it must be completed and submitted no later than the Wednesday following the twelfth week of the course. This assignment is graded on the basis of pass/fail on each assignment. The point value of the completed Course Task Checklist is 250 points.

X). Assignment Five:

Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read though the information on the linked web sites.

XI). Assignment Six:

Go to the course web site and thoroughly and completely read the information posted there. If you have any questions or need additional information, please contact a staff member as soon as possible for assistance and clarification.
Submit this completed, initialed, and signed page as well as any required submissions to the course administrator as an Email attachment no later than the Wednesday following the first week of the course.

LP 2 * UNIT ONE * PRECEPTOR CHECKLIST

Preceptor note: On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

<table>
<thead>
<tr>
<th>Task or Assignment</th>
<th>Preceptor Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Read the information in Principles of Anatomy and Physiology, by Tortora and Derrickson, answer the Self Quiz and Critical thinking questions at the end of the chapter and complete the self-test questions on the material on the course web site</td>
<td>______________</td>
</tr>
<tr>
<td>2. Complete 9 questions based on the reading in the Hendrix text.</td>
<td>______________</td>
</tr>
<tr>
<td>3. Clinical assignment: Demonstrate a working knowledge and the ability to use the following equipment: microscope, centrifuge, refractometer, and electronic blood cell counter</td>
<td>____________</td>
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</tbody>
</table>

_________________________  _______________________
Student Name (printed)         Preceptor Signature

Student or Preceptor Comments:
UNIT TWO

The Lymphatic System
Blood and Blood Parasites
Heartworm Determinations
Clinical Procedures

I). Reading Assignment:

A). *Principles of Anatomy and Physiology* by Tortora and Derrickson
Pages 804 - 845

B). *Laboratory Procedures for Veterinary Technicians* by Charles M. Hendrix, DVM, PhD
Pages 38-48 and 314-321

C). *Veterinary Clinical Parasitology* by Sloss, Kemp, and Zajac
Pages 101-120

During Week Two, you will learn about the lymphatic system and immunity and terminology and special conditions of erythrocytes, learn to identify blood parasites, perform heartworm test procedures, and complete the first clinical exercise.

II). Unit Two Objectives and Assignments:

A). Describe the lymphatic system and immunity.

B). Calculate erythrocytic indices.

C). Learn the terminology associated with RBC morphology and identify abnormal RBCs.

D). Perform heartworm tests.

E). Identify blood parasites.

F). Perform hematological procedures.

G). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.
H). All Unit Two required submissions are due to the course administrator and must be received by the Monday following the second week of the course. They must be accompanied by the signed preceptor checklist for the second unit of the course.

III). Assignment One:

Read the information in *Principles of Anatomy and Physiology*, by Tortora and Derrickson, answer the Self Quiz and Critical thinking questions at the end of the chapter and complete the self-test questions on the material on the course web site.

IV). Assignment Two:

Based on the reading in the Hendrix text, pages 38-48 and 314-321, answer the following questions. You are required to show your answers to your preceptor for confirmation of assignment completion.

1. Match each term with its correct definition.

   _____ The average (mean) volume for a group of erythrocytes
   _____ The average (mean) weight of hemoglobin contained in the average RBC
   _____ The concentration of hemoglobin in an average erythrocyte
   _____ An immature RBC that contains ribosomes that can be visualized using certain stains
   _____ The grouping of erythrocytes in coin-like stacks
   _____ A clumping of erythrocytes often seen in immune-mediated diseases
   _____ Variation in the size of erythrocytes
   _____ RBCs that are larger than normal
   _____ RBCs with a diameter less than that of normal erythrocytes
   _____ RBCs that exhibit a bluish tint when stained with Wright’s stain
   _____ Decreased staining intensity of RBCs due to decreased hemoglobin concentration in the cell
   _____ Cells with normal staining intensity
   _____ Any abnormally shaped erythrocyte
   _____ RBCs with one or more spicules
   _____ RBCs that appear as fragmentary cells
   _____ Spiculated RBCs with two or more pointed projections
   _____ Irregular, spiculated RBCs with a few unevenly distributed surface projections of variable length and diameter
_____ Spiculated cells with numerous, short, evenly spaced, blunt to sharp surface projections of uniform size and shape

_____ Spiculated cells with numerous, short, evenly spaced, blunt to sharp surface projections of uniform size and shape, that are the result of artificial causes such as the slow drying of a blood film

_____ Small, darkly staining erythrocytes with reduced or no central pallor

_____ Thin erythrocytes with increased membrane or decreased volume

_____ RBCs with a central rounded area of hemoglobin, surrounded by a clear zone, with a dense ring of hemoglobin around the periphery

_____ RBCs with a transverse, raised fold extending across the center of the cell

_____ The presence of very small, dark-blue bodies within the erythrocyte

_____ Basophilic nuclear remnants seen in young RBCs during the response to anemia

_____ RBCs that contain an intact nucleus and may be seen normally or in response to anemia

(a) Reticulocytes

(b) Rouleaux formation

(c) Echinocytes (burr cells)

(d) Mean corpuscular volume (MCV)

(e) Basophilic stippling

(f) Schistocytes

(g) Mean corpuscular hemoglobin (MCH)

(h) Macrocytes

(i) Hypochromia

(j) Agglutination

(k) Anisocytosis

(l) Mean corpuscular hemoglobin concentration (MCHC)

(m) Normochromia

(n) Howell-Jolly bodies

(o) Spherocytes

(p) Polychromasia

(q) Microcytes

(r) Keratocytes

(s) Crenation

(t) Acanthocytes (burr cells)
(u) Spiculated cells  
(v) Poikilocytes  
(w) Leptocytes  
(x) Folded cells  
(y) Heinz bodies  
(z) Target cells

1. Mark each answer as either True or False.
   _____ The three erythrocytic indices that are commonly reported on CBCs are the MCV, the MCH, and the MCHC.
   _____ The erythrocytic indices are important to calculate and report because they can give insight into the type and cause of certain anemias.
   _____ Cats unlike other species have two forms of reticulocytes, the aggregate form and the punctate form.
   _____ For a meaningful reticulocyte count in cats, only the punctate forms of reticulocytes should be counted.
   _____ A reticulocyte count is the expression of the percentage of WBCs that are true reticulocytes.
V). Assignment Three:

Using the information given, calculate the MCV, MCH, MCHC, and corrected reticulocyte count. You may need your preceptor’s assistance in setting up the problems. You should expect that you will be required to calculate these values on subsequent exams in Laboratory Procedures 2 and 3. You are required to show your answers to your preceptor for confirmation of assignment completion.

1. A dog with the following CBC values:

   PCV = 42%  
   RBC = 5.5  
   WBC = 14,500  
     Segs = 12,300  
     Lymphs = 2,100  
     Eosinophils = 100  
   T.P. = 8.1  
   Hgb = 12.3  
   Reticulocytes = 5%

2. A dog with the following CBC values:

   PCV = 24%  
   RBC = 4.3  
   WBC = 23,000  
     Segs = 14,000  
     Lymphs = 3,200  
     Eosinophils = 1,000  
     Monocytes = 4,800  
   T.P. = 6.2  
   Hgb = 9.1  
   Reticulocytes = 20%

3. A cat with the following CBC values:

   PCV = 50%  
   RBC = 6.6  
   WBC = 8,600  
     Segs = 3,100  
     Lymphs = 5,500  
     Eosinophils = 0  
   T.P. = 8.9  
   Hgb = 12.7  
   Reticulocytes = 10%
4. A dog with the following CBC values:

- PCV = 12%
- RBC = 2.5
- WBC = 12,500
  - Segs = 8,600
  - Lymphs = 3,000
  - Eosinophils = 900
- T.P. = 6.1
- Hgb = 7.7
- Reticulocytes = 26%

5. A cat with the following CBC values:

- PCV = 22%
- RBC = 2.4
- WBC = 19,300
  - Segs = 17,300
  - Lymphs = 1,800
  - Eosinophils = 200
- T.P. = 6.8
- Hgb = 8.2
- Reticulocytes = 15%

VI). Assignment Four:

1. Based on the reading in the Hendrix and the Sloss texts, schedule a time with your preceptor and have he or she observe you performing the procedures in Task 6-7 on the Course Task Checklist based on the criteria listed there. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.

2. Based on the reading in the Hendrix and the Sloss texts, schedule a time with your preceptor and have he or she observe you performing the procedures in Task 6-13 on the Course Task Checklist based on the criteria listed there. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.

3. Based on the reading in the Hendrix and the Sloss texts, schedule a time with your preceptor and have he or she observe you performing the procedures in Task 6-14 on the Course Task Checklist based on the criteria listed there. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.
VII). Assignment Five:

1. Based on the reading in the Hendrix text, including plates 1-48, you will be expected to be able to identify and define the following morphological conditions of erythrocytes on examinations.
   
a. Reticulocytes  
b. Echinocytes (burr cells)  
c. Schistocytes  
d. Hypochromasia  
e. Anisocytosis  
f. Howell-Jolly bodies  
g. Polychromasia  
h. Keratocytes  
i. Acanthocytes (burr cells)  
j. Poikilocyes  
k. Folded cells  
l. Target cells  
m. Rouleaux formation  
n. Basophilic stippling  
o. Macrocytes  
p. Agglutination  
q. Normochromasia  
r. Spherocytes  
s. Microcytes  
t. Crenation  
u. Spiculated cells  
w. Leptocytes  
x. Heinz bodies  

2. Based on the reading in the Hendrix text and the Sloss text, you will be expected to be able to identify the following blood parasites of animals on examinations.
   
a. *Haemobartonella felis*  
b. *Haemobartonella canis*  
c. *Ehrlichia canis*
d. *Dirofilaria immitis*

e. *Dipetalonema reconditum*

VIII). Assignment Six:

1. With the assistance of a preceptor, perform the hematological procedures listed in Task 6-6 on the Course Task Checklist. You will be expected to perform these tasks on your own as a part of a CBC in subsequent weeks. Preceptors may assist or walk you through the CBC this week. *Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.*

IX). Assignment Three:

Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read though the information on the linked web sites.
Submit this completed, initialed, and signed page as well as any required submissions to the course administrator as an Email attachment no later than the Wednesday following the second week of the course.

LP 2 * UNIT TWO * PRECEPTOR CHECKLIST

Preceptor note: On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

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<tr>
<td>1. Read the information in <em>Principles of Anatomy and Physiology</em>, by Tortora and Derrickson, answer the Self Quiz and Critical thinking questions at the end of the chapter and complete the self-test questions on the material on the course web site.</td>
<td></td>
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<tr>
<td>2. Complete 2 questions based on the reading assignment in the Hendrix text.</td>
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<tr>
<td>2. Complete 5 problems on calculating erythrocytic indices.</td>
<td></td>
</tr>
<tr>
<td>4. Complete Tasks 6-7, 6-13, and 6-14 on the Course Task Checklist. Evaluate student performance and then sign and date the course task checklist.</td>
<td></td>
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<tr>
<td>5. Identify erythrocyte morphology and common blood parasites as described in Assignment Five.</td>
<td></td>
</tr>
<tr>
<td>6. Complete Tasks 6-6 on the Course Task Checklist. Evaluate student performance and then sign and date the course task checklist.</td>
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________________________________________  ____________________________________
Student Name (printed)                      Preceptor Signature

Student or Preceptor Comments:
UNIT THREE

WBC Counts and Differentials

Platelets, Plasma Proteins, and Clotting Time

Clinical Procedures

I). Reading Assignment:

A). Laboratory Procedures for Veterinary Technicians by Charles M. Hendrix, DVM, PhD
   Pages 48-58

During Week Three, you will learn about the different white blood cells and how to calculate the corrected WBC count. You will learn about clotting tests and perform at least one type of clotting test. You will also perform a complete CBC and have it monitored and checked by your preceptor for accuracy.

II). Unit Three Objectives and Assignments:

A). Learn the terminology of leukocytes and perform differential cell counts, including cellular morphology and estimates of platelet concentrations.

B). Calculate corrected WBC counts.

C). Perform a test for clotting integrity.

D). Perform a complete CBC.

C). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.

D). All Unit Three required submissions are due to the course administrator and must be received by the Monday following the third week of the course. They must be accompanied by the signed preceptor checklist for the third unit of the course.
### III). Assignment One:

Based on the reading in the Hendrix text, pages 67-74, answer the following questions. You are required to show your answers to your preceptor for confirmation of assignment completion.

1. Match each term with its correct definition.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>_____</td>
<td>A marked leukocytosis that is usually the result of inflammatory disease and may be confused with leukemia</td>
</tr>
<tr>
<td>_____</td>
<td>Increased cells in the blood</td>
</tr>
<tr>
<td>_____</td>
<td>A condition in which lymphocytes or plasma cells proliferate abnormally</td>
</tr>
<tr>
<td>_____</td>
<td>Increased numbers of leukocytes in the blood</td>
</tr>
<tr>
<td>_____</td>
<td>A group of bone marrow disorders, usually neoplastic, characterized by proliferation of one, several, or all of the bone marrow cell lines</td>
</tr>
<tr>
<td>_____</td>
<td>Decrease in the number of cells in the blood</td>
</tr>
<tr>
<td>_____</td>
<td>Increased number of immature neutrophils in the blood</td>
</tr>
<tr>
<td>_____</td>
<td>Increased number of neutrophils in the blood</td>
</tr>
<tr>
<td>_____</td>
<td>Neoplastic cells in the blood or bone marrow</td>
</tr>
</tbody>
</table>

a. -penia  
b. -philia or -cytosis  
c. Neutrophilia  
d. Leukocytosis  
e. Left shift  
f. Leukemia  
g. Leukemoid response  
h. Lymphoproliferative disorders  
i. Myeloproliferative disorders
2. Indicate whether each statement is True or False.

_____ When performing a differential WBC count, “smudged” cells should not be counted.

_____ Nucleated RBCs are counted when performing total WBC counts; therefore, corrected WBC calculations must be performed to achieve the correct number of leukocytes.

_____ Differential WBC counts should always be expressed as absolute numbers of each individual type of cell.

_____ As a general rule, the total WBC tells what type of body need is present, and the differential tells to what degree the body has need.

_____ To obtain an absolute differential WBC count, the percentage of each cell, expressed as a decimal, is multiplied times the total white cell count.

_____ Toxic changes in neutrophils are usually associated with inflammation, infection, drug toxicity, etc. These changes may be seen in the form of cytoplasmic basophilia, Dohle bodies, vacuoles, cytoplasmic foaminess, or toxic granulation.

_____ Hypersegmentation of neutrophils is usually due to their immaturity or rapid processing of blood before fixing and staining.

_____ One of the best methods of determining platelet numbers is estimating their concentration when reading blood smears.

_____ Platelet clumping is very common and is mostly seen in dogs.

3. Match each cell with its description below.

_____ This cell has a pale blue cytoplasm and a horseshoe or “U” shaped nucleus. It may have fine granules visible in the cytoplasm.

_____ This is the largest of the leukocytes. It has a pale blue cytoplasm and a variably shaped nucleus, and may have vacuoles or cytoplasmic inclusions. Once out of circulation, this leukocyte may become a wandering macrophage.

_____ This cell has a scant amount of blue cytoplasm and a large, dark blue staining nucleus, and may be seen in large or small forms.

_____ This cell has very prominent dark blue-black to purple cytoplasmic granules, with a nucleus that is bean shaped to variable in shape.

_____ The nucleus of this cell is segmented and has two to five segments held together by thin stands of nuclear material. The cytoplasm is usually pale blue in color and may have fine granules or inclusions present.
_____ This cell has prominent reddish to orange-red granules, with a somewhat segmented nucleus.

a. Neutrophil  
b. Band cell  
c. Lymphocyte  
d. Monocyte  
e. Eosinophil  
f. Basophil

4. An average oil immersion microscopic field should contain ____ to ____ platelets per field to ensure an adequate concentration.

5. Calculate the corrected WBC count from the data given.

1. Observed WBC count = 14,500  
   % nucleated RBCs = 5  
   Corrected count =

2. Observed WBC count = 21,400  
   % nucleated RBCs = 3  
   Corrected count =

3. Observed WBC count = 8,600  
   % nucleated RBCs = 12  
   Corrected count =

4. Observed WBC count = 31,300  
   % nucleated RBCs = 2  
   Corrected count =

5. Observed WBC count = 16,750  
   % nucleated RBCs = 8  
   Corrected count =

6. To ensure the ability to clot blood, most animals should have a platelet count of _______________ per microliter or greater.
IV). Assignment Two:

Based on the reading in the Hendrix text, schedule a time with your preceptor and have he or she observe you performing the procedures in Task 6-11 on the Course Task Checklist based on the criteria listed there. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.

V). Assignment Three:

Based on the reading in the Hendrix and the Sloss texts, schedule a time with your preceptor and have he or she observe you performing the procedures in Task 6-6 on the Course Task Checklist based on the criteria listed there. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.

VI). Assignment Four:

Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read through the information on the linked web sites.
Submit this completed, initialed, and signed page as well as any required submissions to the course administrator as an Email attachment no later than the Wednesday following the third week of the course.

**LP 2 * UNIT THREE * PRECEPTOR CHECKLIST**

**Preceptor note:** On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

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<td>1. Complete 6 questions based on the reading in the Hendrix text.</td>
<td></td>
</tr>
<tr>
<td>2. Complete Task 6-11 on the Course Task Checklist. Evaluate student performance and then sign and date the course task checklist.</td>
<td></td>
</tr>
<tr>
<td>3. Complete Task 6-6 on the Course Task Checklist. Evaluate student performance and then sign and date the course task checklist.</td>
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_________________________  ________________________
Student Name (printed)  Preceptor Signature

**Student or Preceptor Comments:**

Laboratory Procedures 2
UNIT FOUR

Case Examples

Transfusions

Introduction to Parasitology

Clinical Assignment

I). Reading Assignment:

*Laboratory Procedures for Veterinary Technicians* by Charles M. Hendrix, DVM, PhD
Pages 67-74 and 294-313

*Veterinary Clinical Parasitology* by Sloss, Kemp, and Zajac
Pages 3-16

During Week Four, you will study case examples to give you insight into how the knowledge you have gained is applied in clinical cases. You will learn the theory and processes behind blood transfusions. You will begin the study of parasitology and be required to perform parasitological procedures.

II). Unit Four Objectives and Assignments:

A). Learn how laboratory findings are used in the diagnosis of clinical cases.

B). Describe the principles and practice of blood transfusions.

C). Describe the basic principles of parasitology.

D). No later than the end of this unit, successfully take and pass the OSHA exam posted on the course web site with a score of 70% or greater.

E). Perform parasitological procedures.

F). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.

G). All Unit Four required submissions are due to the course administrator and must be received by the Monday following the fourth week of the course. They must be accompanied by the signed preceptor checklist for the fourth of the course.
III). Assignment One:

Please read pages 67-70 in the Hendrix text on “Hemograms in Selected Diseases.” The purpose of this section is to give you insight into the diseases and conditions detailed and to illustrate the rationale for the performance of CBCs. If any of the terms or definitions seem unclear to you, please review the material, or consult with your preceptor or a Cedar Valley staff member, to ensure that the definitions and concepts are clear.

IV). Assignment Two:

Read the material in the Hendrix text, pages 70-74, on crossmatching blood for transfusion. Schedule a time with your preceptor and perform a major and minor crossmatch on dog and/or cat blood under the supervision of a preceptor. Have your preceptor ensure that you perform the procedure correctly and that the results are interpreted correctly. This procedure is optional.

V). Assignment Three:

Based on the reading in the Hendrix text, pages 294-313, and the Sloss text, pages 3-16, answer the following questions. You are required to show your answers to your preceptor for confirmation of assignment completion.

Indicate whether the following statements are True or False.

_____ Parasites may infect the oral cavity, esophagus, stomach, small intestine, large intestine blood, and other organs of animals, including humans.

_____ As a general rule, most parasites are identified by finding life cycle stages of the parasite in fecal samples.

_____ As parasite ova age, it becomes more difficult to diagnose parasitism correctly. It is therefore very important to obtain and examine fresh samples of feces for parasites.

_____ Fecal samples that are not going to be examined for parasites within a few hours should be refrigerated or preserved in 90% formalin.

_____ Many parasites are zoonotic; therefore, great caution should be taken in handling the sample and ensuring that the laboratory environment does not become contaminated.

_____ The gross examination of feces should include a report of any abnormality in the consistency or color and also the presence of blood, mucus, or parasites in feces.

_____ The most reliable method of detecting parasites is microscopic examination of feces, using the 4×, 10×, and 40× lens objectives.

_____ Direct fecal smears have a short preparation time, use minimal equipment, but do not concentrate fecal parasites.
The specific gravity for most parasite ova is 1.100 to 1.200, and the specific gravity for most fecal solutions is 1.200 to 1.250.

The most common fecal solutions include sodium nitrate, sugar, zinc sulfate, and sodium chloride.

The standard fecal flotation technique is somewhat difficult to perform, but it is the most effective method of concentrating parasite ova that may be present in feces.

Centrifugal flotation is very easy to perform but is not as good as standard flotation at concentrating ova.

Fecal sedimentation, while being cumbersome and more difficult to perform than some techniques, is useful in detecting ova with very high specific gravities.

Quantitative fecal examination is used to determine the number of ova present in each gram of feces, therefore giving a rough estimation of the number of parasites present in the host.

The trophozoite stage of most coccidia or protozoans is best detected using the direct smear technique.

Fecal cultures are useful for rearing the infective larvae of strongyles, trichostrongyles, or hookworms for identification.

Decanting and sieving are the two best methods of recovering parasites from the digestive tract of animals at necropsy.

Parasitological samples should be shipped in formalin and ethylene oxide to a laboratory unless otherwise directed by the laboratory.

The cellophane tape technique is useful to detect and diagnose the presence of pinworms, especially *Oxyuris equi*.

The Baermann technique is used to detect the presence of nematodes in fecal samples from all animals.
VII). Assignment Four:

Based on the reading in the Hendrix and the Sloss texts, schedule a time with your preceptor and have he or she observe you performing the procedures in Task 6-16 on the Course Task Checklist based on the criteria listed there. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.

VIII). Assignment Five:

Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read through the information on the linked web sites.

IX). Assignment Six:

No later than the end of this unit, successfully take and pass the OSHA exam posted on the course web site with a score of 70% or greater.
Submit this completed, initialed, and signed page as well as any required submissions to the course administrator as an Email attachment no later than the Wednesday following the fourth week of the course.

LP 2 * UNIT FOUR * PRECEPTOR CHECKLIST

Preceptor note: On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

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<tr>
<th>Task or Assignment</th>
<th>Preceptor Initials</th>
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<tbody>
<tr>
<td>1. Perform a major and minor crossmatch on dog or cat blood as suggested in Assignment Two.</td>
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<tr>
<td>2. Complete 20 questions based on the reading in the Hendrix and Sloss texts.</td>
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<tr>
<td>3. Successfully take and pass the OSHA exam posted on the course web site with a score of 70% or greater.</td>
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<tr>
<td>Evaluate student performance and then sign and date the course task checklist.</td>
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Student Name (printed)  Preceptor Signature

Student or Preceptor Comments:
UNIT FIVE
Small Animal Parasitology
Clinical Procedures

I). Reading Assignment:

Laboratory Procedures for Veterinary Technicians by Charles M. Hendrix, DVM, PhD
Pages 257-279

Veterinary Clinical Parasitology by Sloss, Kemp, and Zajac
Pages 17-44

During Week Five, you will learn the life cycles of small animal internal parasites, learn how to identify the internal parasites of small animals, and perform fecal examinations under the supervision of your preceptor. You will be required to perform a CBC under the supervision of your preceptor and have your results verified for accuracy.

II). Unit Five Objectives and Assignments:

A). Discuss and describe the life cycles of internal parasites of dogs and cats.

B). Identify the ova from common parasites of dogs and cats.

C). Perform a CBC.

D). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.

E). All Unit Five required submissions are due to the course administrator and must be received by the Monday following the fifth week of the course. They must be accompanied by the signed preceptor checklist for the fifth unit of the course.
III). Assignment One:

Based on the reading in the Hendrix text, pages 257-279, and the Sloss text, pages 17-44, answer the following questions. You are required to show your answers to your preceptor for confirmation of assignment completion.

Indicate whether each of the following statements is True or False.

_____ When identifying parasites, it is important to be aware of the normal parasite population in your own area, plus the possibility of unexpected parasites from other parts of the world.

_____ Parasitized animals may show a wide variety of clinical signs and the patient's condition should always be correlated with the parasitological findings.

_____ A negative fecal may or may not be diagnostic. Only a positive fecal really yields meaningful information.

_____ The prepatent period is the time from initial infection to when the infection can be detected by using common diagnostic procedures.

_____ The diagnostic stage is when the parasite is confined to the host and is most vulnerable to parasiticidal drugs.

_____ The final host that is infected by the adult, mature parasite is called the transport host.

_____ The host that harbors the larval, immature, or asexual stages of a parasite is called the definitive host.

_____ The stage at which most parasites may be detected in their life cycles is called the diagnostic stage.

_____ Each parasite has a life cycle that is distinctive and is composed of various developmental stages that can occur within the same host or separately within sequential hosts.
IV). Assignment Two:

1. Based on the reading in the Hendrix book, write or draw a simple diagram of the *life cycle* of the following internal parasites of dogs and cats. (You may want to consult your preceptor’s library for additional sources of information on these life cycles.) You should include information on the *zoonotic potential* of each parasite listed as well as information on the *type of ova it produces*, the *harm* it may cause to the host, and its *common name*. You are required to show your assignment to your preceptor for confirmation of assignment completion.

   a. *Spirocercia lupi*
   b. *Physaloptera* sp.
   c. *Toxacara canis and cati*
   d. *Toxascaris leonina*
   e. *Ancylstoma and Uncinara* sp.
   f. *Strongyloides stercoralis and sturniefaeincens*
   g. *Trichurus vulpis*
   h. *Dipylidium caninum*
   i. *Taenia* sp.
   j. *Echinococcus granulosis and multiocularis*
   k. *Diphyllobothrium* sp.

2. Using the illustrations in the Pratt and Sloss texts, you will be responsible for identifying the following parasite ova on clinical fecal examinations as well as on subsequent course examinations.

   a. *Toxacara canis*
   b. *Toxacara cati*
   c. *Toxascaris leonina*
   d. *Ancylstoma* sp.
   e. *Uncinaria* sp.
   f. *Trichurus vulpis*
   g. *Capillaria* sp.
   h. *Spirocercia lupi*
   i. *Strongyloides* sp.
   j. *Aelurostrongylus abstrusus*
   k. *Filaroides* sp.
   l. *Taenia* sp.
m. *Dipylidium caninum*

n. *Diphyllobothrium sp.*

o. *Paragonimus kellicotti*

p. *Alaria sp.*

q. *Isospora sp.*

r. *Toxoplasma gondii*

s. *Giardia cysts and trophozoyte*

V). Assignment Three:  
Based on the specific criteria stated in required tasks 6-16 and 6-17, you are to setup and perform at least 50 small animal fecal examinations during the Laboratory Procedures 2 course. You should have your preceptor check your results to ensure your accuracy and to give you feedback on your findings. Once you have successfully performed all these fecals, have your preceptor date and initial the Course Task Checklist found at the end of this workbook.

VI). Assignment Four:  
Perform a complete CBC based on the criteria in Task 6-6 on the Course Task Checklist. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.

VII). Assignment Five:  
Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read though the information on the linked web sites.
Submit this completed, initialed, and signed page as well as any required submissions to the course administrator as an Email attachment no later than the Wednesday following the fifth week of the course.

**LP 2 * UNIT FIVE * PRECEPTOR CHECKLIST**

*Preceptor note*: On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

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<tr>
<td>1. Complete 9 questions based on the reading in the Hendrix and Sloss texts.</td>
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<tr>
<td>2. Complete Assignment Two based on the reading from the Hendrix and Sloss texts on life cycles and identification of ova.</td>
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<tr>
<td>3. Perform 50 small animal fecals. These standard fecal examinations can be performed at any time during the course. The preceptor should not sign the checklist until the assignment has been completed. <strong>Evaluate student performance and then sign and date the course task checklist.</strong></td>
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<tr>
<td>4. Complete Task 6-6 on the Course Task Checklist. <strong>Evaluate student performance and then sign and date the course task checklist.</strong></td>
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Student Name (printed) Preceptor Signature

Student or Preceptor Comments:
UNIT SIX

Small Animal Parasitology

Clinical Procedures

I). Reading Assignment:

Laboratory Procedures for Veterinary Technicians by Charles M. Hendrix, DVM, PhD
Page 279

Veterinary Clinical Parasitology by Sloss, Kemp, and Zajac
Pages 79–92

During Week Six, you will learn the life cycles of small animal internal parasites, learn how to identify the internal parasites of small animals, and perform fecal examinations under the supervision of a preceptor.

II). Unit Six Objectives and Assignments:

A). Describe and discuss the life cycles of internal parasites of dogs and cats.

B). Identify the ova of parasites of dogs and cats.

C). Familiarize yourself with avian and rodent internal parasites.

D). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.

E). All Unit Six required submissions are due to the course administrator and must be received by the Monday following the sixth week of the course. They must be accompanied by the signed preceptor checklist for the sixth unit of the course.
III). Assignment One:

Based on the reading in the Hendrix book, write or draw a simple diagram of the life cycle of the following internal parasites of dogs and cats. (You may want to consult your preceptor's library for additional sources of information on these life cycles.) You should include information on the zoonotic potential of each parasite listed as well as information on the type of ova it produces, the harm it may cause to the host, and its common name. You are required to show your assignment to your preceptor for confirmation of assignment completion.

a. *Isospora* sp.
b. *Cryptosporidium* sp.
c. *Sarcocystis* sp.
d. *Giardia* sp.
e. *Dirofilaria immitus*
f. *Aleurostrongylus abstrusus*
g. *Capillaria aerophila*
h. *Paragonimus kellicotti*
i. *Dicoccephyma renale*
j. *Thelazia californiensis*
IV). Assignment Two:

Based on the reading in the texts and alternative resources, answer the following questions. You are required to show your answers to your preceptor for confirmation of assignment completion.

1. Match each definition with the best term available.

   _____ An organism that lives in or on another organism and causes harm to that organism
   _____ An organism that must live a parasitic existence
   _____ The entire life cycle is spent on the host.
   _____ An organism that is found in the wrong organ
   _____ Transmission is from definitive to definitive host without the use of a transport host.
   _____ A host that transmits a parasite
   _____ The organism that is being acted on
   _____ An organism that can live free or as a parasite
   _____ Only part of the life cycle is spent on the host.
   _____ An organism found in the wrong host

   a. Temporary
   b. Incidental
   c. Vector
   d. Parasite
   e. Erratic
   f. Facultative
   g. Host
   h. Obligatory
   i. Permanent
   j. Direct life cycle
2. Match each scientific name or term with the common name.

_____ Aleurostrongylus abstrusus a. Hookworm
_____ Toxocara canis b. Roundworm
_____ Strongyloides stercoralis c. Whipworm
_____ Trichuris vulpus d. Threadworm
_____ Spirocerca lupi e. Protozan
_____ Physaloptera sp. f. Tapeworm
_____ Diphylidium caninum g. Fluke
_____ Alaria sp. h. Stomach worm
_____ Isospora sp. i. Lung worm
_____ Ancylstoma caninum j. Bladder worm
_____ Toxascaris leonina k. Esophageal worm
_____ Taenia solium l. Other than above
_____ Diphyllobothrium latum
_____ Paragonimus kellicotti
_____ Uncinaria stenocephla
_____ Capillaria aerophilus
_____ Echinococcus granulosus
_____ Capillaria plica
_____ Taenia teniaeformis
_____ Giardia sp.
3. **Match each parasite with the specific type of ova that would be observed on a fresh fecal sample, flotation, sedimentation, or smear.**

   _____ Aleurostongylus abstrusus  
   _____ Toxocara canis  
   _____ Strongyloides stercoralis  
   _____ Trichuris vulpis  
   _____ Spirocerca lupi  
   _____ Physolopteria sp.  
   _____ Dipyllidium caninum  
   _____ Alaria sp.  
   _____ Isospora sp. 

   a. Live larvae  
   b. Double operculated ova  
   c. Single operculated ova  
   d. Single cell ova  
   e. Single cell organism  
   f. Segmented ova  
   g. Larvated ova  
   h. Hexacanth embryos  

**III). Assignment Four:**

Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read though the information on the linked web sites.
Submit this completed, initialed, and signed page as well as any required submissions to the course administrator as an Email attachment no later than the Wednesday following the sixth week of the course.

**LP 2 * UNIT SIX * PRECEPTOR CHECKLIST**

**Preceptor note:** On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

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<tr>
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<tbody>
<tr>
<td>1. Based on the assigned reading in the Hendrix text, complete Assignment One on life cycles and identification of ova assignment.</td>
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<tr>
<td>2. Complete 3 exercises on internal parasites.</td>
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*Student Name (printed)*  *Preceptor Signature*

**Student or Preceptor Comments:**
UNIT SEVEN

Examination One
Clinical Procedures

I). Exam Assignment:

A). Examination One: Weeks One through Six

II). Unit Seven Objectives and Assignments:

A). Complete Examination One.

B). Perform a complete CBC.

C). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.

D). All Unit Seven required submissions are due to the course instructor or must be postmarked by the Monday following the seventh week of the course. They must be accompanied by the signed preceptor checklist for the seventh unit of the course.
III). Assignment One:

Perform a complete CBC based on the criteria in Task 6-6 on the Course Task Checklist. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.

IV). Assignment Two:

Complete Exam One posted on the course Blackboard site.

V). Assignment Three:

Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read through the information on the linked web sites.
Submit this completed, initialed, and signed page as well as any required submissions to the course administrator as an Email attachment no later than the Wednesday following the seventh week of the course.

**LP 2 * UNIT SEVEN * PRECEPTOR CHECKLIST**

**Preceptor note:** On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

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<tbody>
<tr>
<td>1. Complete Task 6-6 on the Course Task Checklist. <strong>Evaluate student performance and then sign and date the course task checklist.</strong></td>
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<tr>
<td>2. Complete Exam One posted on the course Blackboard site.</td>
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Student Name (printed)     Preceptor Signature

Student or Preceptor Comments:
UNIT EIGHT

Large Animal Parasitology

Clinical Procedures

I). Reading Assignment:

Laboratory Procedures for Veterinary Technicians by Charles M. Hendrix, DVM, PhD
Pages 280-286

Veterinary Clinical Parasitology by Sloss, Kemp, and Zajac
Pages 46-61

During Week Eight, you will learn the life cycles of large animal internal parasites, learn how to identify the internal parasites of large animals, and perform fecal examinations under the supervision of a preceptor.

III). Unit Eight Objectives and Assignments:

A). Discuss and describe the life cycles of internal parasites of cattle and other ruminants.

B). Identify the ova of parasites of cattle and other ruminants.

C). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.

D). All Unit Eight required submissions are due to the course administrator and must be received by the Monday following the eight week of the course. They must be accompanied by the signed preceptor checklist for the eight unit of the course.
III). Assignment One:

1. Based on the reading in the Hendrix book, write or draw a simple diagram of the life cycle of the following internal parasites of ruminants. (You may want to consult your preceptor's library for additional sources of information on these life cycles.) You should include information on the zoonotic potential of each parasite listed as well as information on the type of ova it produces, the harm it may cause to the host, and its common name. You are required to show your assignment to your preceptor for confirmation of assignment completion.

   a. Bovine Trichostrongyles
   b. Moniezia sp.
   c. Fasciola hepatica
   d. Eimeria sp.
   e. Dictyocaulus sp.

2. Using the illustrations in the Pratt and Sloss texts, you will be responsible for identifying the following parasite ova on clinical fecal examinations as well as on subsequent course examinations.

   a. Trichostrongyle sp.
   b. Strongyloides papillosus
   c. Trichuris ovis
   d. Moniezia sp.
   e. Thysanoma actinoides
   f. Fasciola hepatica
   g. Eimeria sp.
   h. Dictyocaulus sp.

IV). Assignment Two:

Based on the specific criteria stated in required tasks 6-16 and 6-17, you are to setup and perform at least 5 large animal fecal examinations during the Laboratory Procedures 2 course. You should have your preceptor check your results to ensure your accuracy and to give you feedback on your findings. Once you have successfully performed all these fecals, have your preceptor date and initial the Course Task Checklist found at the end of this workbook.
V). Assignment Three:

Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read though the information on the linked web sites.
Submit this completed, initialed, and signed page as well as any required submissions to the course administrator as an Email attachment no later than the Wednesday following the eighth week of the course.

**LP 2 * UNIT EIGHT * PRECEPTOR CHECKLIST**

*Preceptor note:* On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

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<tbody>
<tr>
<td>1. Based on readings from the Hendrix and Sloss texts, complete Assignment One on life cycles and identification of ova.</td>
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<tr>
<td>2. Complete 5 large animal fecal flotations. This assignment can be performed at any time during the course. The preceptor should not sign the checklist until the assignment has been completed. Evaluate student performance and then sign and date the course task checklist.</td>
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*Student Name (printed)*  *Preceptor Signature*

**Student or Preceptor Comments:**
UNIT NINE

Large Animal Parasitology

Clinical Procedures

I). Reading Assignment:

Laboratory Procedures for Veterinary Technicians by Charles M. Hendrix, DVM, PhD
Pages 286-293

Veterinary Clinical Parasitology by Sloss, Kemp, and Zajac
Pages 63-78

During Week Nine, you will learn the life cycles of internal parasites found in large animals and how to identify these parasites. You will perform fecal examinations under the supervision of a preceptor. You are also required to perform a CBC and to have the results checked by a preceptor.

II). Unit Nine Objectives and Assignments:

A). Discuss and describe the life cycles of internal parasites in horses and swine.

B). Learn to identify the ova from parasites of horses and swine.

C). Perform a CBC.

D). Review hematology concepts.

E). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.

F). All Unit Nine required submissions are due to the course instructor or must be postmarked by the Monday following the ninth week of the course. They must be accompanied by the signed preceptor checklist for the ninth unit of the course.
III). Assignment One:

1. Based on the reading in the Hendrix book, write or draw a simple diagram of the *life cycle* of the following internal parasites of horses and swine. (You may want to consult your preceptor's library for additional sources of information on these life cycles.) You should include information on the *zoontic potential* of each parasite listed as well as information on the *type of ova* it produces, the *harm* it may cause to the host, and its *common name*. You are required to show your assignment to your preceptor for confirmation of assignment completion.
   a. *Gasterophilus* sp.
   b. *Habronema* sp.
   c. *Draschia* sp.
   d. *Parascaris equorum*
   e. *Strongylus vulgaris*
   f. *Oxyuris equi*
   g. *Anoplocephala perfoliata*
   h. *Eimeria leuckarti*
   i. *Balantidium coli*
   j. *Stephanurus dentatis*
   k. *Trichuruis suis*
   l. *Ascaris suum*

2. Using the illustrations in the Pratt and Sloss texts, you will be responsible for identifying the following parasite ova on clinical fecal examinations as well as on subsequent course examinations.
   a. *Gasterophilis* sp. larvae
   b. *Habronema* sp.
   c. *Draschia megastoma*
   d. *Trichostrongylus axei*
   e. *Parascaris equorum*
   f. *Strongyle* sp.
   g. *Strongyloides westeri*
   h. *Oxyuris equi*
   i. *Anoplocephala* sp.
   j. *Paranoplocephala mamillana*
k. *Eimeria sp.*
l. *Dictyocaulus arnfieldi*
m. *Ascarops strongyлина*
n. *Physoccephalus sexalatus*
o. *Hyostrongylus rubidus*
p. *Ascaris suum*
q. *Strongyloides ransomi*
r. *Oesophagostomum dentatum*
s. *Trichuris suis*
t. *Macracanthorhynchus hirudinaceus*
u. *Balantidium coli*
v. *Isospora suis*
w. *Metastrongylus apri*
x. *Stephanus dentatus*

**IV). Assignment Two:**
Based on the reading in the texts, answer the practice test questions posted on the course Blackboard site.

**V). Assignment Three:**
Perform a complete CBC based on the criteria in Task 6–6 on the Course Task Checklist. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.

**VI). Assignment Four:**
Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read through the information on the linked web sites.
**LP 2 * UNIT NINE * PRECEPTOR CHECKLIST**

Preceptor note: On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

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<tbody>
<tr>
<td>1. Based on your reading in the Hendrix and Sloss texts on life cycles and identification of ova, complete Assignment One.</td>
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<tr>
<td>2. Complete the practice test questions on internal parasites and hematology posted on the course Blackboard site.</td>
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<tr>
<td>3. Complete Task 6-6 on the Course Task Checklist. Evaluate student performance and then sign and date the course task checklist.</td>
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Student Name (printed)         Preceptor Signature

Student or Preceptor Comments:
UNIT TEN

External Parasites
Clinical Procedures

I). Reading Assignment:

Laboratory Procedures for Veterinary Technicians by Charles M. Hendrix, DVM, PhD
Pages 323-342

Veterinary Clinical Parasitology by Sloss, Kemp, and Zajac
Pages 121-136

During Week Ten, you will learn the life cycles of external parasites, learn how to identify external parasites, and perform clinical procedures under the supervision of a preceptor. You are required to complete the Discussion Board Assignment posted in the course web site.

II). Unit Ten Objectives and Assignments:

A). Describe the life cycles of external parasites.

B). Identify external parasites.

C). Perform diagnostic tests to identify external parasites.

D). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.

E). All Unit Ten required submissions are due to the course administrator and must be received by the Monday following the tenth week of the course. They must be accompanied by the signed preceptor checklist for the tenth unit of the course.
III). Assignment One:

1. Based on the reading in the Hendrix book, write or draw a simple diagram of the life cycle of the following external parasites. (You may want to consult your preceptor's library for additional sources of information on these life cycles.) You should include information on the zoonotic potential of each parasite listed as well as its general morphology, the harm it may cause to the host, and the common names of the parasite. You are required to show your assignment to your preceptor for confirmation of assignment completion.
   a. Mallophaga
   b. Anoplura
   c. Diptera
   d. Culicoides
   e. Mosquitoes
   f. Fleas

2. You will be required to identify and/or match each of the following external parasites with its common name, its method of pathogenesis, and be able to identify its general classification.
   a. Mallophaga
   b. Anoplura
   c. Simulium
   d. Culicoides
   e. Chrysops
   f. Stomoxys calcitrans
   g. Hematobia irritans
   h. Melophagus ovinus
   i. Musca autumnalis
   j. Musca domestica
   k. Cochliomyia hominivorax
   l. Cuterebra sp.
   m. Hypoderma sp.
   n. Ctenocephalidea felis and canis
   o. Echidnophaga gallinacea
IV). Assignment Two:

Perform a skin scraping based on the criteria in Task 3-72 on the Course Task Checklist. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date for this week.

V). Assignment Three:

Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read though the information on the linked web sites.
Submit this completed, initialed, and signed page as well as any required submissions to the course administrator as an Email attachment no later than the Wednesday following the tenth week of the course.

**LP 2 * UNIT TEN * PRECEPTOR CHECKLIST**

**Preceptor note:** On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

<table>
<thead>
<tr>
<th>Task or Assignment</th>
<th>Preceptor Initials</th>
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<tbody>
<tr>
<td>1. After reading the Hendrix and Sloss texts, complete Assignment One on life cycles, pathogenesis, and identification of external parasites.</td>
<td></td>
</tr>
<tr>
<td>2. Complete Task 3-72 on the Course Task Checklist. Evaluate student performance and then sign and date the course task checklist.</td>
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_________________________  ___________________________
Student Name (printed)       Preceptor Signature

**Student or Preceptor Comments:**
UNIT ELEVEN

External Parasites

Clinical Procedures

I). Reading Assignment:

*Laboratory Procedures for Veterinary Technicians* by Charles M. Hendrix, DVM, PhD
Pages 342-364

*Veterinary Clinical Parasitology* by Sloss, Kemp, and Zajac
Pages 136–175

During Week Eleven, you will learn the life cycles of external parasites, learn how to identify the external parasites, and perform clinical procedures under the supervision of a preceptor. You will be required to perform a CBC and have the results checked by a preceptor.

II). Unit Eleven Objectives and Assignments:

A). Describe the life cycles of external parasites.

B). Identify external parasites.

C). Perform a CBC.

D). Complete the Course Task Checklist and submit it by the end of this unit.

E). Read through the Unit Tutorial and complete any self tests or exercises, and view the linked Internet web sites.

F). All Unit Eleven required submissions are due to the administrator and must be received by the Monday following the eleventh week of the course. They must be accompanied by the signed preceptor checklist for the eleventh unit of the course.
III). Assignment One:

1. Based on the reading in the Hendrix book, write or draw a simple diagram of the life cycle of the following external parasites. (You may want to consult your preceptor's library for additional sources of information on these life cycles.) You should include information on the zoonotic potential of each parasite listed as well as its general morphology, the harm it may cause to the host, and the common names of the parasite. You are required to show your answers to your preceptor for confirmation of assignment completion.
   a. Mites
   b. Ticks
   c. Filaroidea
   d. *Dirofilaria immitis*

2. You will be required to identify and/or match each of the following external parasites with its common name, its method of pathogenesis, and be able to identify its general classification.
   a. *Sarcoptes* sp.
   b. *Notoedres* cati
   c. *Psoroptes cuniculi*
   d. Large animal *Psoroptes* sp.
   e. *Chorioptes* sp.
   f. *Otodectes cynotis*
   g. *Demodex* sp.
   h. *Cheyletiella* sp.
   i. *Trombicula* sp.
   j. *Argus* sp.
   k. *Rhipicephalus sanguineus*
   l. *Dermacentor variabilis*
   m. *Ambylomma americanum*
   n. *Ambylomma maculatum*
   o. *Boophilus annulatus*
   p. *Dirofilaria immitis*
IV). Assignment Two:

Based on the reading in the texts, answer the practice test questions posted on the course Blackboard site.

V). Assignment Three:

Perform a complete CBC based on the criteria in Task 6-6 on the Course Task Checklist. Once completed, have your preceptor evaluate your work on the Checklist, and then sign and date and submit the completed Course Task Checklist by the end of this unit.

VI). Assignment Four:

Read and study the Unit Tutorial posted on the course web site and complete any self tests or exercises. Please view and read though the information on the linked web sites.
Submit this completed, initialed, and signed page as well as any required submissions to the course administrator as an Email attachment no later than the Wednesday following the eleventh week of the course.

### LP 2 * UNIT ELEVEN * PRECEPTOR CHECKLIST

**Preceptor note:** On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

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<td>2. Based on the reading in the texts, answer the practice test questions posted on the course Blackboard site.</td>
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<tr>
<td>3. Complete Task 6-6 on the Course Task Checklist. <strong>Evaluate student performance and then sign and date the course task checklist. The Course Task Checklist is due by the end of this week.</strong></td>
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________________________________________  ______________________________________
**Student Name (printed)**                        **Preceptor Signature**

Student or Preceptor Comments:
UNIT TWELVE

*Final Course Examination*

I). Exam Two:

Complete Exam Two based on Weeks One through Twelve

II). Week Twelve Assignments:

A). Complete Exam Two posed on the course web site.

B). Complete the Course Evaluation and submit it to AAHA.
**Preceptor note:** On written assignments, the preceptor is required only to verify that the questions were answered. The preceptor is not required to grade written assignments, but discussion and professional evaluation will help the student.

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<td>1. Complete Exam Two posted in the course Blackboard site.</td>
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<tr>
<td>2. Complete the course evaluation posted on the course Website and return it to AAHA.</td>
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</tbody>
</table>

**Student Name (printed)** __________  **Preceptor Signature**

**Student or Preceptor Comments:**
DEVTP End-of-Course Evaluation

As a part of this course, you are requested to complete a survey that evaluates all aspects of the course. The survey is available on the Internet through your course site and should be submitted electronically. The survey is located in the "Course Documents" section of your site and should be completed sometime during the twelfth unit of the class.

Your responses to the survey will be kept in the strictest confidence and will not affect your grade. AAHA will report only your name to CVC after you complete the survey. AAHA will not report individual results to CVC. When the semester is over, the survey results will be used to make DEVTP even stronger.