

CASPER COLLEGE
MLTK 1500 HI Clinical Hematology and Hemostasis

Semester/Year: Fall 2015

Lecture Hours: 2 Lab Hours: 4 Credit Hours: 3

Class Time: Lecture Moodle Days: Moodle Room: Moodle

Student Labs: Friday 12-5:
9/11 9/25 10/23 11/13 12/11 Aley Hall 106

Instructor's Name: Bernardino D. Madsen MT, (ASCP)

Instructor's Contact Office Phone: 268-2522 Email:dmadsen@caspercollege.edu

Office Hours: Monday 8-10, Tuesday 4-6, Wednesday 9-10, Thursday 10-11 Aley 212

Course Description:

An introductory course in the theoretical principles and procedures of hematology and hemostasis combined with relevant application to clinical laboratory medicine. This course provides background knowledge and opportunities to develop technical competencies for laboratory testing of blood, blood products, coagulation, and anticoagulant therapy. Emphasis is on the formed elements of the blood and components of the coagulation cascade and their correlation with pathophysiology. This course will be taught via Moodle with corresponding monthly Friday/Saturday laboratories.

Statement of Prerequisites:

BIOL 1000 or BIOL 1010, MOLB 2210 or instructor permission.

Health Requirements You will need to obtain proof of the following health requirements to be in student laboratory.

- Health Insurance (Private or available through Casper College)
- Hepatitis B vaccination (at least the first in the series of three)

Goal:

The students will build upon their knowledge and skills learned in previous laboratory classes gaining specific information on the formed elements of the blood, blood products, anemia, myelo- and lympho-proliferative disease, coagulation mechanisms and coagulopathies.

Students will explain, characterize, compare and evaluate patient data for the presence of disease states and disorders.

Students will demonstrate a working comprehension of the technical and procedural aspects of laboratory testing, safety and ethical standards of practice through performance and practice.

Outcomes:

1. Distinguish normal and abnormal microscopic characteristics of blood cells through performance of a complete blood count.
2. Perform manual and automated testing, assess laboratory data and predict the diagnosis of hematological and coagulation disorders and diseases.
3. Correlate hematological findings with those generated in other areas of the clinical laboratory.
4. Describe the origin and development of platelets.
5. Relate platelet structure to physiology and function.
6. List coagulation factors and describe their function in fibrin formation.
7. Distinguish modes of action and therapeutic use of anticoagulants.
8. Associate hemostatic dysfunction with clinical disease.
9. Solve Problems Using Critical Thinking and Creativity (Casper College general education outcome #3)

Methodology:

Formal and informal lecture, one-on one instruction, group demonstration and student laboratory are used in combination for student instruction.

Evaluation Criteria:

REQUIRED STUDENT TASK/ASSIGNMENTS

The required tasks and assignments are used to evaluate the student's acquisition and comprehension of the learning objectives. Assignments are designed allow students utilize information from class lecture and discussion, and place into practice, technical skills and decision making. Details about each assignment (including grading criteria) will be discussed in class.

LECTURE EXAMS/POP QUIZZES/FINAL: (50%)

Midterm exams will cover materials listed in the learning objectives for defined segments or units outlined on the lecture schedule. Most material will be covered specifically in class but, exam questions may cover materials presented in the assigned reading. You may want to purchase review books (ASCP, NCA and others), which provide practice questions for subjects we cover in class. There will be three lecture exams and a comprehensive final. You must be present to take "pop" quizzes and earn those points. Exams can only be made up if prior notification of absence is provided by the student.

LAB SKILLS AND PRACTICALS: (30%)

Students will be expected to practice laboratory skills to develop techniques used in manual and automated analysis. There will be three laboratory practical exams given during lab sessions. The purpose is to assess your knowledge of fundamentals and methodology, and skills in performing these techniques for clinical testing. Lab exams will challenge you to perform certain laboratory skills as well and analyze clinical situations, specimens and data. Exams can only be made up if prior notification of absence is provided by the student.

LAB REPORTS: (10%)

Students will perform laboratory tests related to RBC, WBC, platelets and the fibrin forming systems. For each lab exercise performed, the student will write a 1-2 page report describing the testing performed and the results obtained.

Hematology Atlas: (10%)

Students are asked to create their own hematology atlas utilizing the digital Nikon microscope and the MLT slide collection. The atlas will include normal and abnormal white blood cells, in conjunction with normal and abnormal red blood cell morphology. Disease correlation with abnormal cells will also be included in the atlas.

GRADING:

A = 92-100%	Final grades: Lecture exams/Pop Quizzes/Final	50%
B = 82-91%	Lab skills/Practicals	30%
C = 70-81%	Lab reports	10%
D = 60-69%	Case Study Evaluations	10%
F = <60%		

Required Text, Readings, and Materials:

Ciesla, Betty (2007) *Hematology in Practice*, F. A. Davis
Philadelphia, Pennsylvania, (ISBN 0-8036-1526-4)

Anderson, Shauna, Poulsen, Keila (2003) *Anderson's Atlas of Hematology*, Lippincott Williams and
Wilkins, Philadelphia, Pennsylvania, (ISBN 0-7817-2662-X)

Required Personal Protective Equipment (PPE)

(you will need to purchase)

Scrubs (any color)

Safety goggles

Class Policies:

Last Date to Change to Audit Status or to Withdraw with a W Grade is the Casper College deadlines.

Exams must be completed without the use of textbooks, notes or assistance from classmates.

Attendance is required for lecture and student labs. No make-up labs will be available.

Student Rights and Responsibilities: Please refer to the Casper College Student Conduct and Judicial Code for information concerning your rights and responsibilities as a Casper College Student.

Chain of Command: If you have any problems with this class, you should first contact the instructor in order to solve the problem. If you are not satisfied with the solution offered by the instructor, you should then take your problem through the appropriate chain of command starting with the department head, then the division chair, and lastly the vice president for academic affairs.

Student complaints should be addressed through the following chain of command:

- 1) The instructor of your course. (Bernardino D. Madsen)
- 2) MLTK Program Director (Dr. Audrey Hentzen)
- 3) Dean of Health Science, (Dr. Tammy Frankland).
- 4) The Interim Vice President for Academic Affairs (Dr. Shawn Powell).

Academic Dishonesty - Cheating & Plagiarism: Casper College demands intellectual honesty. Proven plagiarism or any form of dishonesty associated with the academic process can result in the offender failing the course in which the offense was committed or expulsion from school. See the Casper College Student Code of Conduct.

ADA Accommodations Policy: It is the policy of Casper College to provide appropriate accommodations to any student with a documented disability. If you have a need for accommodation in this course, please make an appointment to see me at your earliest convenience.

Official Means of Communication: Casper College faculty and staff will employ the student's assigned Casper College email account as a primary method of communication. Students are responsible to check their account regularly.

Calendar or schedule indicating course content:

Topical Outline

MORPHOLOGIC CHARACTERISTICS OF BLOOD CELLS

- a. Erythropoietic cell series
- b. Abnormal erythrocytes
- c. Granulopoiesis
- d. Lymphopoiesis

DIAGNOSIS OF LYMPHOPROLIFERATIVE DISORDERS

- a. Chronic and acute lymphocytic leukemia
- b. Lymphoma
- c. Multiple myeloma
- d. Tests for lymphoproliferative disorders
 1. Bone marrow and lymph node biopsies
 2. Cell markers
 3. Cytogenetics

DIAGNOSIS OF MYELOPROLIFERATIVE DISORDERS

- a. Chronic and acute myelocytic leukemia
- b. Myeloproliferative diseases
- c. Myelodysplastic diseases
- d. Tests for myeloproliferative disorders
 1. Bone marrow biopsy
 2. Cytochemical staining
 3. Cytogenetics
 4. Molecular testing

DIAGNOSIS OF ANEMIA

- a. Iron, cobalamin and folate deficiencies
- b. Sideroblastic anemia
- c. Immune hemolytic anemia
- d. Thalassemia
- e. Hemoglobins S, C, D and E
- f. Enzymatic deficiencies
- g. Tests for anemia diagnosis
 1. Iron studies

2. DAT
3. Hemoglobin electrophoresis
4. Enzyme tests

THE VASCULAR SYSTEM

- a. The role of blood vessels in coagulation
- b. Tests of blood vessel integrity
- c. Bleeding disorders associated with vessel dysfunction

THE PLATELET SYSTEM

- a. The origin of platelets
- b. The physiology and function of platelets
- c. Tests of platelet number and function
 1. Platelet count
 2. Bleeding time
 3. Platelet aggregation
- d. Bleeding disorders involving platelets

FIBRIN FORMATION

- a. Coagulation factors and interactions
- b. Regulation of the coagulation cascade
- c. Tests of the coagulation cascade
- d. Bleeding disorders involving coagulation factors
 1. Prothrombin time
 2. Partial thromboplastin time
 3. Thrombin time
 4. Factor assays

FIBRINOLYSIS

- a. The process of fibrinolysis
- b. Hypercoagulability and disseminated intravascular coagulation
- c. Thrombolytic and anticoagulant therapy
- d. Tests for fibrinolysis
 1. Fibrin degradation products
 2. D-dimer test

August 24: Chapter 1

The microscope and Basic Laboratory Practices

Quality Control / Quality Assurance

August 31: Ch 2

Hematopoiesis and the Complete Blood Cell Count

Morphological Classification of Anemia / Red Blood Cell Indices

September 7 Ch 3:

Red Blood Cell Production, Function, and Morphology

Red Blood Cell Metabolism

September 14: Exam 1 and Ch 4:

Hemoglobin Function and Metabolism

September 21: Ch 5:

Microcytic Anemia

Microcytic Anemia

September 28: Ch 6:

Macrocytic Anemia

Macrocytic Anemia

October 5: Ch 7 and 8:

Normochromic anemias

October 12: Ch 9:

Leukopoiesis

Leukopoiesis

October 19: Ch 10 and Exam 2:

Abnormalities or White blood Cells

Fall Break

EXAM 2

October 26: Ch 11:

Acute Leukemias

Acute Leukemias

November 2: Ch 12:

Chronic Leukemias

Chronic Leukemias

November 9: Ch 13 and 14:

Lymphoproliferative Disorders

Myeloproliferative Disorders

November 6: Exam 3 and Ch 15:

EXAM 3

Primary Hemostasis

Secondary Hemostasis

November 23: Ch 16 and 17:

Quantitative and Qualitative Platelet Disorders

Defects of Plasma Clotting Factors

November 30: Ch 18:

Fibrinogen, Thrombin and Fibrinolytic System
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December 7:

Exam 4

December 14:

Comprehensive Final Exam

Lab Schedule: **Note, ALL LAB SESSIONS ARE MANDATORY**

9-12/13

Lab 9/11	Unipetts Hemogram RBC morphology Normal White Blood cell differential
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Lab 9/25	Lab Exam Abnormal WBC differentials Anemias Leukemias
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	ESR Mono test
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Lab 10/23	Test Bone Marrows Leukemias Special Stains Flow Cytometry Bleeding time Work on cell atlas
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Lab 11/13	Test PT/PTT/FIB DDimer Finish student atlas
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Finals 12/11	Comprehensive Final Lab Exam
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