



Course Outline

Course Number
MLT 212

Course Title
CLINICAL HEMATOLOGY

Credits
4

Hours:
Lecture 3/Lab 3

Prerequisite: MLT 112
or permission of instructor

Spring 7A
2017

Catalog description:

Examines hematology and blood coagulation, including blood cell maturation, physiology, and morphology; hemostasis theory and procedures. Laboratory component develops skills used in the performance of hematology and coagulation lab analysis.

Course Modified: 06/2017

Required texts:

Title: Hematology in Practice 2nd edition
Author: Betty Ciesla
Publisher: F.A. Davis

Title: Clinical Hematology Atlas
Author: Carr, Rodak
Publisher: Saunders

Course Instructor:

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MCCC's General Education Knowledge Goals and Core Competencies

Cours's General Education Knowledge Goals

- Goal 1. Written and Oral Communication in English:** Students will communicate effectively in both speech and writing.
- Goal 2. Mathematics:** Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
- Goal 3. Science:** Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
- Goal 4. Technology or Information Literacy:** Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
- Goal 8. Diversity and Global Perspective:** Students will understand the importance of a global perspective and culturally diverse peoples.

MCCC Core Competency Skills

- A. Communication:** Students will communicate effectively in both speech and writing.
- B. Critical Thinking and Problem-Solving:** Students will use critical thinking and problem solving skills in analyzing information.
- C. Ethical Reasoning and Action:** Students will understand ethical issues and situations.
- D. Information Literacy:** Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
- E. Computer Literacy:** Students will use computers to access, analyze or present information, solve problems, and communicate with others.
- F. Collaboration and Cooperation:** Students will develop the interpersonal skills required for effective performance in group situations.
- G. Intra-Cultural and Inter-Cultural Responsibility:** Students will demonstrate an awareness of the responsibilities of intelligent citizenship in a diverse and pluralistic society, and will demonstrate cultural, global, and environmental awareness.

Units of study:

Week 1: Learning objectives (Chapters 1-4)

After completing this week, the student will be able to:

1. Describe safe work practices, personal protective equipment and disposal of biologic hazards in the hematology lab. (G1, CC A, C, F, G)
2. Describe the components of quality assurance in the hematology laboratory. (G1, CC A, C)
3. Discuss the basic parts of the light microscope and the function and magnification of each objective. (G1,3,4, CC A)
4. Describe the organs involved in hematopoiesis throughout fetal and adult life. (G1,3, CC A)
5. Define factors affecting differentiation of the pluripotent stem cell. (G1,3, CC A)
6. Define the myeloid: erythroid ratio. (G1,3, CC A)
7. Understand the bone marrow collection procedure and the technologist's role in bone marrow analysis. (G3)
8. List the components of a complete blood count. (G1,3)
9. Define and calculate red blood cell indices. (G1,2,3, CC A)

10. Recognize normal and critical values in an automated CBC. (G3, CC B)
11. Describe the clinical conditions that may produce polychromatophilic cells and elevate the reticulocyte count. (G1,3, CC A)
12. Define the morphologic classification of anemias. (G1,3, CC A)
13. Outline erythropoietic production from origin to maturation of red blood cells. (G3)
14. Describe immature red blood cells with regard to nucleus: cytoplasm ratio, cytoplasm color, nuclear structure and size. (G1,3, CC A)
15. Identify the metabolic pathways that provide energy for red blood cells. (G3)
16. Describe the composition of the red blood cell membrane. (G1,3, CC A)
17. Understand factors necessary for maintaining a normal red blood cell life span. (G3)
18. Define anisocytosis, poikilocytosis, microcytic and macrocytic. (G1,3, CC A)
19. Indicate clinical conditions in which variations in size and hemoglobin content are seen. (G1,3)
20. Identify the pathophysiology and the clinical conditions that may lead to target cells, spherocytes, ovalocytes and elliptocytes, sickle cells, and fragmented cells. (G3)
21. List the most common red blood cell inclusions and the disease states in which they are observed. (G3)
22. Describe hemoglobin structure and function of normal adult hemoglobin, Hgb A, Hgb A2 and Hgb F. (G1, CC A)
23. Relate the shift from fetal hemoglobin to adult hemoglobin. (G3, CC B)

Psychomotor Performance Objectives:

24. Demonstrate safe laboratory practices. (G3)
25. Show proficiency in making peripheral blood smears. (G3)
26. Recognize and differentiate between normal and abnormal RBC morphology.

Week 2: Learning Objectives (Chapters 5-6)

After completing this week, the student will be able to:

1. Describe red blood cell indices related to microcytic anemias. (G1,3, CC A)
2. Describe iron transport from ingestion to incorporation in hemoglobin. (G1,3, CC A)
3. Identify the laboratory tests used in the diagnosis of iron deficiency anemia. (G3)
4. Define the pathophysiology, diagnosis and clinical management of patients with hereditary hemochromatosis. (G1,3, CC A)
5. Describe the basic pathophysiologic defect in the thalassemia syndromes. (G1,3, CC A)
6. Correlate the morphologic changes in the red blood cell with the defect in the alpha and beta thalassemsias. (G3, CC B)
7. Describe the criteria that define a macrocytic anemia as megaloblastic. (G1,3, CC A)
8. Compare and contrast the morphologic characteristics of megaloblasts and normoblasts in the bone marrow. (G1,3, CC A)
9. Describe the pathway of vitamin B12 and folic acid from ingestion through incorporation into the red blood cell. (G1,3, CC A)
10. Define pernicious anemia and its clinical and laboratory findings. (G1,3, CC A)
11. Describe laboratory tests used in the diagnosis of megaloblastic anemia. (G1,3, CC A)
12. Differentiate the anemias that are macrocytic but are not megaloblastic. (G3)

Psychomotor Performance Objectives:

1. Understand the principles used in automated RBC counts (G3,4)
2. Be able to define and calculate RBC indices (G1, 2,3, CC, A)
3. Show proficiency in performing a microhematocrit, sedimentation rate (ESR) and reticulocyte Count (G3)

Week 3: Learning Objectives (Chapters 7-8)

After completing this week, the student will be able to

1. Review the functions of the spleen as they relate to red blood cells (G3)
2. Describe the clinical findings in patients with hereditary spherocytosis. (G1,3, CC A)
3. Describe the osmotic fragility test and its clinical usefulness. (G1,3, CC A)
4. Identify the red blood cell membrane defects and peripheral smear findings in hereditary stomatocytosis, elliptocytosis, and pyropoikilocytosis. (G3)
5. Define the pathophysiology of the red blood cell biochemical disorders including glucose- 6- phosphate dehydrogenase deficiency. (G1,3, CC A)
6. Describe Heinz bodies with respect to their appearance in supravital and Wright's stain. (G1,3, CC A)
7. Define the defect in the rare membrane disorders of hereditary xerocytosis and Southeast Asian ovalocytosis. (G1,3, CC A)
8. Discuss the characteristics of aplastic anemia, paroxysmal nocturnal hemoglobinuria, paroxysmal cold hemoglobinuria, Fanconi's anemia, and Diamond- Blackfan syndrome. (G1,3, CC A)
9. Identify the amino acid substitution in sickle cell disorders and Hgb C disease. (G3)
10. List the clinical and laboratory features of sickle cell anemia, sickle cell trait, Hgb C disease, Hgb C trait and Hgb SC disease. (G1,3,5)
11. Recognize normal and abnormal hemoglobin patterns on hemoglobin electrophoresis at pH8.6 and 6.2. (G3, CC B)
12. Differentiate the clinical and laboratory features of other abnormal hemoglobins, such as Hgb E, Hgb OArab, Hgb DPunjab, and Hgb GPhila. (G3)
13. Calculate the white blood cell correction formula when nucleated red blood cells are noted in the peripheral smear. (G2,3)

Psychomotor Performance Objectives:

1. Demonstrate proficiency in performing assays with the Sickle Cell test kit. (G3)
2. Describe the use of the Unopette system in hematology testing. (G1,3, CC A)
3. Show proficiency in using the Unopette system and hemocytometer in performing manual cell counts. (G3)

Week 4: Learning Objectives (Chapters 9-11)

After completing this week, the student will be able to

1. Describe leukopoiesis from immature forms to full maturation. (G1,3, CC A)
2. Name morphologic features used in differentiating cells of the granulocytic series. (G1,3, CC A)
3. Describe features that differentiate the granules of the neutrophilic,

- eosinophilic, and basophilic cell lines. (G1,3, CC A)
4. Describe the lymphatic system and its relationship to lymphocyte production. (g1,3, CC A)
 5. Identify conditions that cause a quantitative increase or decrease in a particular white blood cell line. (G3)
 6. Identify conditions that lead to hyposegmentation or hypersegmentation of neutrophils. (G3)
 7. Describe the effects of HIV on the CBC and the peripheral smear. (G1,3, CC A)
 8. Describe the process of reactive lymphocytosis in infections with Epstein- Barr virus and cytomegalovirus. (G1,3, CC A)
 9. Define white blood cell– related terms such as leukocytosis, left shift, leukemoid reaction and leukoerythroblastic reaction. G1,3, CC A)
 10. Describe briefly lipid storage diseases, such as Gaucher’s disease, Niemann- Pick disease, and Tay- Sachs disease. (G1,3,5, CC A)
 11. Compare and contrast acute versus chronic leukemia with respect to age of onset and presenting symptoms. (G1,3, CC A)
 12. Describe acute leukemia with emphasis on symptoms, peripheral blood and bone marrow findings. (G1,3, CC A)
 13. Classify acute leukemias according to the French- American- British (FAB) classification system. (G3)
 14. Briefly describe the World Health Organization (WHO) classification for acute myeloid leukemias and related myeloid proliferations. (G1,3, CC A)
 15. Describe how cytochemical staining can aid in the diagnosis of acute leukemias. (G1,3, CC A)
 16. List the most pertinent CD markers for various acute leukemias. (G3)
 17. Explain the WHO classification of acute lymphoblastic leukemia/lymphoma. (G1,3, CC A)
 18. Describe acute lymphoblastic leukemia with emphasis on age of onset, symptoms at presentation, prognosis, and laboratory findings. (G1,3, CC A)
 19. Show proficiency in using the Unopette system and hemocytometer in performing manual cell counts. (G3)

Psychomotor Performance Objectives:

1. Show proficiency in making peripheral smears for manual WBC differentials. (G3)
Demonstrate proficiency in performing assays with the Sickle Cell test kit. (G3)
2. Be able to differentiate and count the various white blood cell lines.

Week 5: Learning Objectives (Chapters 9-11)

After completing this week, the student will be able to

1. Discuss the classification and pathogenesis of myeloproliferative disorders. (G1,3, CC A)
2. Understand the clinical features associated with chronic myeloproliferative disorders. (G3)
3. Show proficiency in making peripheral smears for manual WBC differentials. (G3)
4. Define the common features of the chronic lymphoproliferative disorders. (G1,3, CC A)
5. Describe the peripheral smear morphology of individuals with chronic lymphocytic leukemia. (G1,3, CC A)

6. Describe features of hairy cell leukemia on peripheral smear and with cytochemical stains. (G1,3, CC A)
7. Define the clinical features of Sézary syndrome. G1,3, CC A)
8. List the morphologic features of the plasma cell and the basic immunoglobulin unit. (G3)
9. List the laboratory criteria used to diagnose the monoclonal gammopathies. (G3)
10. Differentiate the clinical and laboratory features that distinguish multiple myeloma and Waldenström's Macroglobulinemia. (G3, CC B)
11. List the CD markers used to differentiate B- cell and T- cell disorders. (G3)
12. Briefly describe how molecular diagnostics aids in the diagnosis of lymphoid malignancies. (G1,3,4, CC A)
13. Define the myelodysplastic syndromes and discuss the major cellular abnormalities of MDSs. (G1,3,CC A)
14. Classify MDSs according to the criteria of the World Health Organization. (G3)

Psychomotor Performance Objectives:

1. Understand and describe the principles of WBC automation and Flow cytometry. (G1,3,4,CC A)

Week 6: Learning Objectives (Chapters 15-17)

After completing this week, the student will be able to

1. Explain the systems involved in hemostasis. (G1,3, CC A)
2. Describe the interaction of the vascular system and platelets as it relates to activation, adhesion, and vasoconstriction. (G1,3, CC A)
3. Identify the process involved in the coagulation cascade, from activation to stable clot formation. (G3)
4. Describe the role of platelets in hemostasis. (G1,3, CC A)
5. Define the difference between primary and secondary hemostasis. (G1,3, CC A)
6. Outline the intrinsic and extrinsic pathways, the factors involved in each, and their role in the coagulation system. (G3)
7. List the coagulation factors, their common names, and function. (G3)
8. Explain the interaction between prothrombin time, activated partial thromboplastin time, and factor assays. (G1,3, CC A)
9. Identify the relationship of the kinin and complement systems to coagulation. (G3)
10. Identify the inhibitors of the coagulation and the fibrinolytic systems and their role in hemostasis. (G3)
11. Identify the types of bleeding that are seen in platelet disorders. (G3)
12. List laboratory tests that are helpful in evaluating platelet disorders. (G3,4)
13. State how preanalytic variables may affect the platelet count. (G1,3, CC A)
14. Describe three characteristics of the qualitative platelet disorders von Willebrand's disease, Bernard- Soulier syndrome, and Glanzmann's thrombasthenia. (G1,3, CC A)
15. Identify drugs that are implicated in immune thrombocytopenia. (G3)
16. Evaluate conditions that may cause thrombocytosis. (G3, CC B)
17. Compare and contrast acute versus chronic idiopathic thrombocytopenic purpura. (G1,3,CC A)
18. Define hemolytic uremic syndrome and thrombotic thrombocytopenic

- purpura in terms of pathophysiology and clinical features. (G1,3, CC A)
19. Describe platelet abnormalities caused by acquired defects– drug- induced, nonimmune, or vascular. (G1,3, CC A)
 20. Outline the genetics, symptoms and lab tests used for individuals with hemophilia A and B. (G3)

Psychomotor Performance Objectives:

Week 5: Learning Objectives (Chapters 18-19)

After completing this week, the student will be able to

1. Identify the components of the fibrinolytic system. (G3)
2. Describe plasmin in terms of activation and inhibition. (G1,3, CC A)
3. Differentiate the role of thrombin in the coagulation and fibrinolytic systems. (G3)
4. Outline the inherited disorders of fibrinogen. (G3)
5. Describe the laboratory tests for fibrinolytic disorders. (G1,3, CC A)
6. Define conditions that may precipitate disseminated intravascular coagulation (DIC) states. (G1,3, CC A)
7. Describe the laboratory testing and management of patients with DIC. (G1,3, CC A)
8. Define thrombophilia and thrombosis. (G1,3, CC A)
9. Describe antithrombin, protein C, and protein S with regard to properties, mode of action, factors affected, and complications associated with their deficiencies. (G1,3, CC A)
10. Describe heparin- induced thrombocytopenia with regard to the cause, patient's clinical manifestations, and pathophysiology of the disease. (G1,3, CC A)
11. Discuss the laboratory tests and results used for the diagnosis of factor V Leiden and heparin induced thrombocytopenia. (G1,3,4, CC A)
12. List the types of anticoagulant drugs used for the treatment of thrombotic disorders. (G1, G3, CC A)
13. Discuss the laboratory test used for monitoring of heparin and Coumadin therapy. (G1,3, CC A)
14. Define the anti– factor Xa assay and its clinical application. (G1,3, CC A)

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Psychomotor Performance Objectives:

1. WBC manual differential review: Continue to show proficiency in making and performing manual WBC differentials. (G3)

Laboratory – Exit Level Skill Competencies

1. Demonstrates proficiency in the enumeration of cellular elements. Given samples the student will perform replicate retic, platelet and cell count evaluations within +/- 10% proficiency of actual patient or QC results. (G2,3)
2. Given automated CBC reports and accompanying blood smears, the student will correlate results and evaluate blood smears to match patient results within a +/- 10% proficiency. (G3,4, CC B)
3. Perform differential smear evaluations on patients with normal and abnormal results. Students will reproduce results within +/- 10% proficiency of actual patient results. (G3)

4. Students will be able to recognize abnormal blood smears that require supervisory review. (G3)
5. Students will evaluate coagulation test results for PT and APTT tests. Students should meet a minimum 77% score on the evaluation of coagulation test results. (G3)
6. Student will be able to enumerate blood cells in fluid samples within a +/- 10% proficiency of patient results. (G3)

Grading Policy:

1. To receive a passing grade, students must earn a 77 or higher. A final grade of 77 or higher is required in each Medical Laboratory Technology course in order to progress to the next MLT course and to graduate. No make-up exams are to be given unless there are extenuating circumstances.

A	93-100%	B-	80-82
A-	90-92	C+	77-79
B+	87-89	C	70-76
B	83-86	D	60-69
		F	0-59%

Lecture

4 Quizzes	10%
Objectives	10%
Midterm	15%
Final	<u>15%</u>
	50%

Laboratory

Lab Review	10%
Professional Behavior	10%
Midterm	15%
Final	<u>15%</u>
	50%

Affective Objectives

Affective objectives are behavioral standards that will be implemented during the professional phase of the Medical Laboratory Technology Program. Students will be evaluated by faculty using these standards throughout the course. Unsatisfactory performance in any area of the behavioral standards will require a consultation with the faculty and/or the MLT Program coordinator. The reason for the consultation will be clearly stated, counsel will be given and an action plan will be implemented. The student will be given the opportunity to give a written response. The consultation form will be kept in the student's file.

Affective Scoring based on Professional Performance

Affective objectives are behavioral standards that will be implemented during the professional phase of the Medical Laboratory Technology Program. Students will be evaluated by faculty using these standards throughout the course. The student is evaluated on the demonstration of performance that reflects achievement of important objectives for medical laboratory technicians. This professional performance will be evaluated during the laboratory course and will be returned to the student with their all laboratory worksheets submitted. See the last page for a detailed list of the criteria.

PROFESSIONAL PERFORMANCE EVALUATION

1. DEPENDABILITY

The student arrives in the laboratory with adequate time to start lab session as scheduled. The student comes with appropriate manual and supplies, and wearing required laboratory attire. The student shows evidence of having reviewed the assigned topic before coming to the laboratory. The student completes assignments (lab reports, homework assignments, etc) on time.

2. ATTENTIVENESS

The student is attentive to the instructor, takes complete notes and proceeds with laboratory work without repeated instructions. The student follows verbal and written instructions, asks pertinent questions when necessary, and seeks the instructor's assistance when needed. The student neither distracts others nor allows distractions to affect completion of laboratory exercises.

3. ORGANIZATION

The student demonstrates the ability to organize work to be done within the available laboratory time. The student is able to perform multiple tasks without jeopardizing accuracy and precision.

4. INDEPENDENCE

The student demonstrates the ability to work independently by exercising independent judgement and thinking logically in using the protocols and instructions given. The student draws on previously gained information to solve problems without prompting from instructor. The student seeks activities to expand knowledge, ability and performance.

5. RECORD KEEPING

The student demonstrates the importance of proper record keeping by accurately and legibly labeling/recording laboratory work and reports (i.e. sample containers, reagents and worksheets).

6. MANAGEMENT AND ECONOMY

The student conserves reagents and supplies. The student maintains an adequate supply of common use items at their appropriate workstation. The student takes proper care of equipment.

7. SAFETY

The student works in an orderly and safe manner, enabling others to safely work in the same general area. The student adheres to the guidelines of the Laboratory Safety Regulations (e.g. wearing eye protection, keeping long hair tied back, and properly storing hazardous materials).

8. INTERPERSONAL SKILLS

The student communicates in a professional, positive, tactful manner with peers and instructors. The student consistently shows common courtesy (e.e. restocks supplies) and contributes towards achieving an environment conducive to work and learning for self and others.

9. COMPOSURE

The student maintains composure and work quality under stressful conditions and adapts quickly to new situations. The student recognizes his/her own personal strengths and weaknesses and works positively within that framework. The student accepts evaluation of performance as constructive when offered by instructors and follows through with suggestions made.

10. INTEGRITY

The student accepts accountability for work performed. The student readily admits errors, follows procedures (including quality control) as written, and maintains confidentiality of patient results, if applicable. Student exhibits perseverance to obtain accurate results.

Scoring: Total number of possible points= # of weeks x # of categories X 4 (Greatest achievable score) =n Achieved points = student scores: Total of numbers each week (#4s + #3s+ #2s+#1s)

Cut off values: Upper cut-off value=0.675n; lower cut-off value= 0.425n

How your Final Grade can be Affected

If $a > 0.675n$, then the course grade is increased one step (e.g., from C to C+)

If a is between $0.425n$ and $0.675n$, then the course grade is unaffected (e.g. C remains C)

If $a < 0.425(n)$, then the course grade is decreased one step (e.g. C to C-).

If course grade remains within range: student will receive full credit for affective score

Progression in the MLT Professional Courses

As noted in the course handbook, a final grade of a C+ or better in each Medical Laboratory Technology course is necessary to progress to the next professional phase course.

Unsatisfactory Performance

Unsatisfactory performance in any area (cognitive, psychomotor or affective), failure to follow directions or procedures, unsafe or unethical behavior, or failure to keep a grade of 77 or above in the course will require a consultation with the faculty and/or the MLT Program coordinator. The reason for the consultation will be clearly stated, counsel will be given and an action plan will be implemented. The student will be given the opportunity to give a written response. The consultation form will be kept in the student's file and progress must be made by following the plan of action.

Absence and Tardiness:

While I do not directly count attendance in the overall grade, it will be factored into your weekly professional behavior assessment. As such, I expect to be notified ahead of time if possible in the case that you cannot attend lecture or laboratory.

Cellular Telephones, Personal Telephone Calls, and Electronic Devices

Students are NOT to receive or place telephone calls or text messages during class, labs, or clinical hours. Cellular telephones and other electronic devices are to be silenced before entering the classroom, student laboratory, or the clinical site. Inappropriate use of any electronic device may result in disciplinary action.

Late work:

I expect assignments to be turned in at the start of class. **I do not accept late assignments. Late work will receive no points.** If you are sick on the day an assignment is due, you can e-mail me the assignment before lecture time. If this is an extended absence, you should phone or email me as soon as possible to discuss your return and submission of work with documentation. I encourage you to email me, or make an appointment if you are having any problems.

Academic Integrity Policy:

Any student who (1) knowingly represents the work of others as his/her own, (2) uses or obtains unauthorized assistance in the execution of any academic work or (3) gives fraudulent assistance to another, is guilty of cheating. Violators will be penalized in accordance with established college policies and procedures.

Support Services for Differing Abilities

Mercer County Community College is in compliance with both the ADA and section 504 of the Rehabilitation Act. If you have, or believe you have, a differing ability that is protected under the law please contact Arlene Stinson in LB 216, 609 570-3525, stinsona@mccc.edu for information regarding support services.

If you do not have a documented differing ability, other support services are available to all students on campus including the Learning Center located in LB 214

Note: Students must seek out help from this department and alert the instructor of the accommodation(s) prior to the start of the course. We CANNOT make the accommodations AFTER the course has started.

MCCC
MLT 212: Clinical Hematology
Lecture and Lab Schedule

Schedule is subject to change as deemed necessary.

Date	Lab	Lecture	Assigned Objectives
July 5	Sed rate, Intro to smears and stain	Chapter 1	4,5,8,9
July 6	Smear, Intro to RBC morphology	Chapters 2,3	Ch. 2: 4,5,10,12,13 Ch. 3: 9,10,11,12,13,14,15
July 11	RBC Morphology	Chapters 4, Quiz	1,3,7,11
July 12	WBC Intro	Chapters 5	1,4,7, 9,12,15,17,18
July 13	WBC ID and RBC morphology	Chapters 6, 7	Ch. 6: 1,2,4,5,8,11 Ch. 7: 2,7,12
July 18	Sickle screen, Microhematocrit	Chapters 8, Quiz	2,3,5,8,14
July 19	Intro to differentials	Chapter 9,10	Ch. 9: 1,2,3,8 Ch. 10: 1,2,4,6,8,11
July 20	Normal Differentials	Chapter 11, Review	1,2,5,8,10
July 25	Midterm	Midterm (Ch.1-10)	
July 26	Body Fluids	Chapter 12	1,2,4,7
July 27	Normal Differentials	Chapter 13	1,2,6,8,9
Aug 1	Normal and Abnormal Differentials	Chapter 14, Quiz	1,2,3,6
Aug 2	Normal and Abnormal Differentials	Chapter 15	1,2,5,6,7
Aug 3	Normal and Abnormal Differentials	Chapter 16	3,4,7,9,10
Aug 8	Normal and Abnormal Differentials Cell ID Quiz Due	Chapter 17, 18	Ch. 17: 2,3,5 Ch. 18: 1, 2, 3, 7, 8
Aug 9	Normal and Abnormal Differentials	Chapter 19, Review	1,5,8,10,
Aug 10	Final	Final (Cumulative)	