The Clinical Laboratory Science Medical Technology Program

COURSE: CLSC 4411 Clinical Hematology II

INSTRUCTOR:
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Office hrs: M&W 11-12:30PM T 11-12PM

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COURSE DESCRIPTION: Continuation of Hematology I with an emphasis on abnormal morphology and related disease states. Coagulation abnormalities and associated clinical conditions will also be covered as well as the more specialized techniques in hematology and coagulation.

FREQUENCY OF OFFERING: SPRING

PREREQUISITIES: Admission into the Clinical Laboratory Science Program & CLSC 3310

CREDIT HOURS: 4

Textbook:
3. Hematology Manual Provided
5. Pocket Heme Notes, Harmening, D. F.A. Davis Co. (recommended)

Additional References
Method of Evaluation

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>3 Hour Exams</td>
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<tr>
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<td>1 Final Exam</td>
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<td>Quizzes</td>
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<tr>
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<td>Case Studies</td>
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<td>3% 3%</td>
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“Shoot for the moon. Even if you miss, you’ll land among the stars.”

Course Requirements

1. Students are expected to attend each class session and to follow the attendance policies as described in the Student Standards and Expectations.
2. There will be no makeups for lab sessions without a written doctor’s excuse.
3. Students are responsible for being present for all exams. All exams will be announced at least one class meeting prior to examinations.
4. Besides the traditional method of instruction, this course will have components of a FLIPPED Course, where students gather information outside of class and be prepared to engage the material in class.
5. Students are expected to participate in active learning activities provided by the instructor. Such activities include group work, presentations, classroom talk, etc. Participation will be evaluated by the affective evaluation form.
6. Students will be assigned certain tasks in the laboratory on a rotating basis which will be included as part of the affective evaluation.
7. All students must adhere to the safety rules of the laboratory. Students will not be allowed to participate in the laboratory without proper attire. Gloves must be worn at all times. Adherence to safety regulations will be evaluated as part of the affective grade.

Grade Determination

A= 90-100%
B= 80-89%
C= 70-79%
*D= 65-69%
*F= Below 65%

*These grades are not acceptable to meet program requirements.

- Students must pass both the lecture and laboratory portions with a minimum of 70%.
- Should a student not receive a passing average in either section, the lowest of the grades will be used to assign the final grade.
- For lecture and lab, exams & final/or practicals must total at least a 70% in order for quizzes diffs and case studies to be averaged in.
8. Attendance is considered as part of the students’ overall course grade. The student is expected to be on time and attend all lecture and laboratory sessions. Make ups for exams will only be considered when documentation of a legitimate family emergency or severe illness is presented to the instructor.

9. Students are expected to participate in active learning activities provided by the instructor. Such activities include group work, presentations, classroom talk, etc. Participation will be evaluated by the affective evaluation form.

10. Students are expected to arrive on time. Three instances of being tardy will be considered as one absence. Students who have more than three unexcused absences in a semester may be dropped from the class by the instructor.

11. Students are expected to help maintain a classroom environment that is conducive to learning. To ensure that all students have the opportunity to gain from time spent in the classroom, students are prohibited from engaging in any form of disruptive behavior such as the use of cellular phones and beepers during class, arriving late or leaving class early, missing deadlines, prolonged chattering, reading other materials during class, and making offensive remarks to fellow students or faculty. Inappropriate behavior in the classroom or laboratory may result, minimally in a request to leave the class. Patterns of repeated behavior or more severe infractions may be referred to the Dean of Students.

12. Weekly quizzes will be online using Respondus Lockdown Browser, and open from Friday at noon until Sunday midnight or given in-class. For in-class quizzes prior notice may or may not be given. No makeups for quizzes will be given. The lowest quiz grade will be dropped.

13. Late work assignments will be deducted 5 points per day.

14. University policy requires all electronic communication between the University and students be conducted through the official University supplied systems; namely UTRGVMail for email or Blackboard for course specific correspondence. Therefore, please use your UTRGV assigned email or Blackboard account for all future correspondence with UTRGV faculty and staff.

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Students with disabilities:
If you have a documented disability (physical, psychological, learning, or other disability which affects your academic performance) and would like to receive academic accommodations, please inform your instructor and contact Student Accessibility Services to schedule an appointment to initiate services. It is recommended that you schedule an appointment with Student Accessibility Services before classes start. However, accommodations can be provided at any time. Brownsville Campus: Student Accessibility Services is located in Cortez Hall Room 129 and can be contacted by phone at (956) 882-7374 (Voice) or via email at accessibility@utrgv.edu. Edinburg Campus: Student Accessibility Services is located in 108 University Center and can be contacted by phone at (956) 665-7005 (Voice), (956) 665-3840 (Fax), or via email at accessibility@utrgv.edu.

Mandatory Course Evaluation Period

Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (http://my.utrgv.edu); you will be contacted through email with further instructions. Online evaluations will be available Apr. 11 – May 2, 2018. Students who complete their evaluations will have priority access to their grades.

“The difference between ordinary and extraordinary is that little extra.”
SEXUAL HARASSMENT, DISCRIMINATION, & VIOLENCE:
In accordance with UT System regulations, your instructor is a “responsible employee” for reporting purposes under Title IX regulations and so must report any instance, occurring during a student’s time in college, of sexual assault, stalking, dating violence, domestic violence, or sexual harassment about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at www.utrgv.edu/equity, including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect in an environment free from sexual misconduct and discrimination.

SCHOLASTIC INTEGRITY
As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, plagiarizing, and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced (Board of Regents Rules and Regulations and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents will be reported to the Dean of Students.

VAQUERO HONOR CODE
Honesty, Integrity, & Respect
As members of a community dedicated to honesty, integrity, and mutual respect in all interactions and relationships, the students, faculty and administration of our university pledge to abide by the principles in the Vaquero Honor Code.

- WE ARE HONEST
  We do our own work and are honest with one another in all matters. We understand how any act of dishonesty, including cheating, plagiarizing, falsifying data, and giving or receiving unauthorized assistance, conflicts as much with academic achievement as with the values of honesty and integrity.

- WE HAVE INTEGRITY
  We do not lie, cheat, steal, or tolerate those who do. We will make personal and academic integrity fundamental in all of our endeavors.

- WE ARE RESPECTFUL
  We act civilly and cooperate with one another for the common good. We will strive to create an environment and a culture in which people respect and listen to one another. We recognize a university is, above all, a place for the exchange of ideas, popular and unpopular. It is the one institution in society that encourages challenges to conventional wisdom. Consequently, we pledge to encourage the exchange of ideas and to allow others to participate and express their views openly.
VAQUERO HONOR CODE CONT…

The Vaquero Student Honor Statement:
I pledge I will not cheat, plagiarize, falsify data or give or receive unauthorized assistance on academic work in accordance with the Vaquero Honor Code. I further pledge to support a culture of academic integrity.

Student Guidelines:
The student is responsible for seeking a better understanding of any of the concepts discussed above by consulting with a faculty member; visit the library website, and/or calling the Dean of Students Office at 956-665-2260.

Violations of the Vaquero Honor Code should be reported to the faculty in charge of the course or Student Rights and Responsibilities.
The identity of the student reporting violations of the Vaquero Honor Code will be confidential until such time as the student chooses to have their identity revealed.
The Student Hearing Process and Appeal Procedures outlined in section STU 02–100 of the Handbook of Operating Procedures outlines the rights afforded to students who are accused of violating the Student Conduct and Discipline and the Vaquero Honor Code.

The Vaquero Faculty Honor Statement:
I recognize students’ rights and pledge to uphold the principles of honesty, integrity, and mutual respect in all interactions and relationships at UTRGV. I pledge to follow the Faculty Guidelines (see below) in treating student academic misconduct.

ATTENDANCE:
Students are expected to attend all scheduled classes and may be dropped from the course for excessive absences. UTRGV’s attendance policy excuses students from attending class if they are participating in officially sponsored university activities, such as athletics; for observance of religious holy days; or for military service. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations.

COURSE DROPS:
According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the "3-peat rule" and the "6-drop" rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.
OVERALL PROGRAM LEARNING OUTCOMES

1. Demonstrate entry level knowledge and skills in the area of hematology.
2. Demonstrate entry level knowledge and skills in the area of clinical chemistry.
3. Demonstrate entry level knowledge and skills in the area of immunohematology.
4. Demonstrate entry level knowledge and skills in the area of clinical microbiology
5. Demonstrate entry level knowledge and skills in the area of immunology.
6. Demonstrate entry level knowledge and skills in the area of urinalysis and body fluids.

Upon completion of this course and without the aid of notes or textbook, the student should be able to achieve the following objectives. Achievement will be met when a minimum score of 70% percent is earned as detailed in the methods of evaluation section of this syllabus.

COURSE OBJECTIVES

AFFECTIVE OBJECTIVES

Upon completion of the laboratory and lecture sections of this course, the student should be able to:

1. Show a concern for his/her own safety as well as those of fellow students by adhering to established safety rules.
2. Demonstrate dependability by attending all lecture and laboratory sessions and arriving promptly at the designated time.
3. Follow instructions on procedures and use of materials.
4. Demonstrate an acceptance of responsibility for his/her own learning by consistently preparing for class and laboratory sessions, voluntarily seeking information; asking pertinent questions and setting personal priorities to allow for academic success.
5. Show initiative by completing assigned tasks without without reminders and seeking additional tasks as appropriate.
6. Listen attentively during class activities and actively participate in class.

LECTURE OBJECTIVES

1. Classify the cells in developmental order that will mature into erythrocytes, platelets, plasma cells, and the 5 white blood cell types.
2. Compare the (6) cytoplasmic features which aid in identifying cell maturity and type.
3. Summarize the average percentage and cellular characteristics of the six mature white blood cells found in normal blood.
4. Compare the morphological characteristics of defective erythrocyte maturation and megaloblastic maturation with normal maturation.
5. State the normal value for an uncorrected reticulocyte count.
6. Calculate corrected reticulocyte count and RPI when given necessary laboratory results.
7. Identify congenital and acquired disorders related to defects in the synthesis of heme.
8. Evaluate the outcomes of a deficiency in globin production.
9. Compare and contrast intravascular and extravascular destruction of the erythrocyte.
10. Differentiate the normal values for RBC, hemoglobin and hematocrit for various age groups from abnormal values.
11. Calculate MCV, MCH, and MCHC given erythrocyte values.
12. Correlate clinical conditions with hypochromia and polychromatophilia.
13. Differentiate agglutination and rouleaux and correlate clinical conditions associated with each.
15. Describe the major laboratory manifestations of anemia.
16. Distinguish how erythrocyte morphology is graded descriptively and numerically.
17. Select appropriate hematology lab tests for diagnosing anemia.
18. Justify additional tests performed in other laboratory sections that may aid in the diagnosis of anemia.
19. Compare the 3 organizations of anemias according to RBC size and state the limitation of this type of system.
20. Define pancytopenia.
21. Classify anemias given sets of laboratory data.
22. Compare and contrast secondary and relative polycythemia.
23. Identify various conditions which may produce disorders of erythropoietin production.
24. Justify how categorizing anemias by physiology would be advantageous.
25. Compare relevant laboratory findings for each of the anemias of impaired erythrocyte production.
26. Identify the 5 inherited hemolytic anemias due to structural membrane defects and compare their etiologies.
27. Identify the inherited hemolytic anemias caused by RBC enzyme defects and defects of the hemoglobin molecule.
28. Summarize the causes of acquired hemolytic anemia.
29. Correlate laboratory results with inherited and acquired hemolytic anemias.
30. Describe the etiology, physiology and lab findings in PNH.
31. Compare the 3 categories of hemoglobin defects.
32. Compare the etiologies and laboratory results of sickle cell anemia, thalassemia, and sickle cell trait.
33. Given laboratory test results and QC data, evaluate the information and determine an appropriate course of action.
34. Given anemia case studies and laboratory data, evaluate the results and determine the most likely cause of the findings.
35. Explain the appearance and etiology of the four morphologic abnormalities found in mature neutrophils.
36. Identify conditions that may cause leukocytosis or leukocytopenia.
37. Distinguish absolute counts from relative counts.
38. Correlate conditions with increases and decreases in neutrophils, eosinophils, basophils, and monocytes.
40. Distinguish between acute and chronic leukemia.
41. Classify the two major divisions of acute leukemias.
42. Identify the characteristic cell found in Hodgkin's lymphoma.
43. Identify the most frequent structural chromosomal abnormality in PV.
44. State the major and minor criteria designated by the National Polycythemia Vera Study Group for establishing a diagnosis.
45. Compare and contrast the characteristics of PV with other polycythemias.
46. Identify a complication of PV that often precedes leukemic transformation.
47. State the primary control method in treating PV.
48. Identify 5 factors implicated in causing leukemias and lymphomas.
49. Correlate a genetic defect associated with an increased incidence of leukemia.
50. Correlate the occurrence of leukemia with ethnic origin and race, age, and gender.
51. Given case studies including laboratory data, classify the leukemias using the FAB and WHO classification.
52. Compare clinical symptoms, laboratory findings, and blood morphologies in M1, M2, M3, M4, M5, M6, M7, L1, L2, and L3.
53. Explain the principle and purpose of the Sudan Black B stain.
54. Name a stain that parallels the Sudan Black B stain.
55. Explain where myeloperoxidase is located in cells and the usefulness of this test.
56. Justify the usefulness of the Periodic Acid-Schiff stain, what it stains, and what type of cells it is positive in.
57. Compare Naphthol AS-D chloroacetate and Alpha-naphthyl esterase stains in terms of positive and negative reactions.
58. Explain why monoclonal antibodies, chromosomal analysis and molecular genetics are useful in identifying leukemias and lymphomas.
60. Describe the general characteristics of chronic leukemias.
61. Explain how electron microscopy and chromosome analysis are useful in the diagnosis and prognosis of chronic lymphocytic leukemia.
62. Compare clinical symptoms and laboratory data in acute lymphocytic leukemias.
63. State the original name for Hairy cell leukemia and describe the lymphocytes and cytochemical reactions in this disease.
64. Describe the characteristics of the lymphomas and identify what may happen if they spill over into the blood circulation.
65. State the name of the leukemic phase of cutaneous T cell lymphoma also known as mycosis fungoides.
66. Describe plasma cell leukemia.
67. Differentiate between Multiple myeloma and Waldentström's Macroglobulinemia based on clinical and laboratory findings.
68. Compare and contrast peripheral blood findings in the myeloproliferative disorder
69. Relate the MPDs with associated coagulation abnormalities.
70. Describe the prognostic features and general treatment approach to the MPDs.
71. Discuss the pathophysiology of CML including genetic changes and the bcr/abl oncogene
72. Compare the clinical signs and symptoms in the three phases of CML.
73. Describe laboratory findings in blood and bone marrow in CML.
74. Justify the usefulness of the leukocyte alkaline phosphatase stain in CML.
75. Discuss the prognosis of CML and modes of treatment
76. Differentiate AML from ALL using immunophenotyping with selected monoclonal antibodies.
77. Outline the epidemiology of idiopathic myelofibrosis.
78. State the predominant clinical manifestation and leukoerythroblastic picture in idiopathic myelofibrosis.
79. Describe the pathophysiology of idiopathic myelofibrosis.
80. Characterize the karyotype profile of idiopathic myelofibrosis.
81. State the mean survival time for myelofibrosis.
82. Explain how myelofibrosis is treated.
83. Identify the major criteria used in diagnosing essential thrombocythemia.
84. Describe the epidemiology and major features of essential thrombocythemia.
85. Discuss the common disorders occurring in patients with essential thrombocythemia.
86. Compare the bone marrow morphology of essential thrombocythemia with that in other chronic myeloproliferative disorders.
87. Relate essential thrombocythemia to polycythemia vera.
88. Discuss the treatment approach to essential thrombocythemia.
89. Correlate chromosomal abnormalities with MPDs.
90. Explain how myelodysplastic syndromes develop.
91. Describe the age and gender distribution of the myelodysplastic syndromes.
92. Correlate chromosomal abnormalities with myelodysplastic syndromes.
93. List the clinical signs and symptoms of MDS.
94. List cellular alterations and hematological features of MDS.
95. Compare the laboratory results of specific types of MDS.
96. Explain the forms of treatment and supportive care in MDS.
97. Given a case study including laboratory data, evaluate the findings and determine the most likely cause of the disorder.

98. Select additional tests to be performed when given a case study and laboratory results in order to evaluate a possible WBC disorder.

99. Compare the 4 categories of platelet dysfunction.

100. List 9 specialized coagulation procedures and explain their principles.

101. Explain the 4 biological activities which normally protect the body against thrombosis.

102. Describe the activities of ATIII as a normal defense mechanism in the body.

103. Name the 2 heparin dependent thrombin inhibitors in plasma and describe their roles.

104. Explain the functions of Protein C and Protein S.

105. Explain how cellular proteases limit the formation or spread of clotting and the reliquefaction of clots.

106. Explain how body cells regulate coagulation.

107. List the 3 categories of disorders of blood coagulation factors.

108. Identify conditions contributing to defective production of blood coagulation factors.

109. Describe the physiology of destroying and consuming coagulation factors.

110. Explain the role of Factor VIII, Protein C, and thrombin in fibrinolysis.

111. List and describe factors contributing to pathological inhibition of coagulation.

112. Explain how vascular damage, blood flow and platelets play a role in the hypercoagulable state.

113. Relate changes blood coagulation factors to increased tendencies toward thrombosis.

114. Correlate the relationship between impaired fibrinolysis and Protein C, ATII, and plasminogen.

115. Describe the process of fibrinolysis.

116. Evaluate laboratory data in DIC and fibrinolysis.

117. Identify laboratory tests used to prove the presence of hypercoagulability.

118. Interpret coagulation results when given a case study and laboratory data.

119. Select appropriate coagulation tests to be performed when given a case study and laboratory results.

120. Describe the composition of seminal fluid.

121. Prepare proper instructions for a patient to collect a semen specimen.

122. Differentiate normal findings from abnormal findings on semen specimens including volume, pH, count, motility, morphology, liquefaction, blood, and white cells.

123. Calculate a sperm count given the number counted, dilution, and the area of the counting chamber used.

124. Evaluate sperm motility and forms.

125. Identify three infertility tests which are not a part of a routine semen analysis.

126. Differentiate semen from other questionable fluids utilizing appropriate criteria.
LABORATORY OBJECTIVES

Upon completion of the laboratory, the student will be able to:

1. Calculate red blood cell indices given RBC count, HGB, and HCT.
2. Prepare and stain a blood smear which meets acceptable criteria found in the lab manual.
3. Perform a 100 cell normal differential including morphology and platelet estimate within the limits set by the instructor within a time limit of 10 minutes.
4. Perform a 100 cell abnormal differential including morphology and platelet estimate within the limits set by the instructor within a time limit of 20 minutes.
5. Interpret the clinical significance of a complete blood count when given a case study.
6. Perform a reticulocyte count obtaining results within a 5 cell difference from the instructor.
7. Correct a reticulocyte count in the presence of anemia and calculate the RPI.
8. Identify nucleated red blood cells on differentials.
9. Correct a total WBC count when nucleated red cells are present.
10. Describe how an osmotic fragility test is performed.
11. Interpret the results of an osmotic fragility curve.
12. Perform and interpret a sickle cell screening test.
13. Identify immature white cells on differentials according to the criteria given in class with 80% accuracy.
14. Identify special stains and the cells stained by each.
15. Identify atypical lymphocytes on blood smears according to the criteria given in class with 80% accuracy.
16. Perform successful venipunctures using techniques which meet the criteria discussed in class.
17. Perform a successful capillary puncture on an adult using acceptable techniques according to the criteria described in class.
18. Describe appropriate procedures for collecting a capillary heelstick.
19. Identify sources of error in performing venipunctures.
20. Evaluate the need for any special procedures associated with patient contact during venipuncture.
21. Justify the importance of proper patient identification.
22. Describe the steps in the venipuncture procedure.
23. Identify criteria for specimen rejection.
24. Correlate test requisitions with their proper color-coded tubes.
25. Identify PPE necessary when performing venipunctures.
26. Perform a fibrinogen level with acceptable control results and attaining results which agree with the values of the instructor.
27. Perform an FDP test with acceptable control results and attaining results which agree with the values of the instructor.
28. Perform a D-dimer test with acceptable control results attaining results which agree with the values of the instructor.
29. Interpret the clinical significance of a coagulation workup given a case history.
30. Identify sources of errors in performing coagulation tests.
31. Identify special stains for leukemias (including LAP stain) and correlate positive results with the respective leukemia.
32. Perform proper quality control procedures obtaining results within 2 SDs.
33. Determine corrective actions needed when results are flagged.
34. Interpret patient data generated by Hematology instruments, including parameters and histograms.
35. Determine when an automated differential is acceptable and when to perform a manual differential.
36. Identify normal and abnormal cells in body fluids.
37. Calculate cell counts in body fluids using the hemacytometer.
38. Identify problems in pre-analytic, analytic and post-analytic testing in hematology and determine appropriate corrective action.
39. Perform 50 differentials.
<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Lecture #</th>
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</thead>
<tbody>
<tr>
<td>Jan 15</td>
<td>MLK</td>
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</tr>
<tr>
<td>Jan 16</td>
<td>Introduction to Anemia</td>
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</tr>
<tr>
<td>Jan 18</td>
<td>Anemia of Iron &amp; Heme Synthesis</td>
<td>2</td>
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<td>Jan 19</td>
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<tr>
<td>Jan 23</td>
<td>Megaloblastic &amp; Macrocytic Anemias</td>
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<tr>
<td>Jan 25</td>
<td>Hypoproliferative Anemias</td>
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<td>Jan 26</td>
<td>Intro to Hemolytic Anemia</td>
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<tr>
<td>Jan 30</td>
<td>Anemia of Iron &amp; Heme Synthesis</td>
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<tr>
<td>Feb 1</td>
<td>Hemolytic Anemia: Membrane &amp; Enzyme Defects</td>
<td>6</td>
</tr>
<tr>
<td>Feb 2</td>
<td>Non-Immune Anemias</td>
<td>7</td>
</tr>
<tr>
<td>Feb 6</td>
<td>Hemoglobinopathies: Qualitative Defects</td>
<td>8</td>
</tr>
<tr>
<td>Feb 8</td>
<td>Hemoglobinopathies: Qualitative Defects</td>
<td>9</td>
</tr>
<tr>
<td>Feb 9</td>
<td>Thalassemia</td>
<td>10</td>
</tr>
<tr>
<td>Feb 13</td>
<td>Thalassemia</td>
<td>11</td>
</tr>
<tr>
<td>Feb 15</td>
<td>Review</td>
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</tr>
<tr>
<td>Feb 16</td>
<td>EXAM I</td>
<td>12</td>
</tr>
<tr>
<td>Feb 20</td>
<td>Myeloproliferative Disorders</td>
<td>13</td>
</tr>
<tr>
<td>Feb 22</td>
<td>Myelodysplastic Syndromes</td>
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<tr>
<td>Feb 23</td>
<td>Acute Leukemia: Myeloid</td>
<td>14</td>
</tr>
<tr>
<td>Feb 27</td>
<td>Acute Leukemia: Lymphoid</td>
<td>15</td>
</tr>
<tr>
<td>Mar 1</td>
<td>Acute Leukemia: Cytochemical Stains</td>
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</tr>
<tr>
<td>Mar 2</td>
<td>Mature Lymphoid Neoplasms: Burkitt’s Lymphoma</td>
<td>16</td>
</tr>
<tr>
<td>Mar 6</td>
<td>Mature Lymphoid Neoplasms: Chronic Lymph Dis.</td>
<td>17</td>
</tr>
<tr>
<td>Mar 8</td>
<td>Cytogenetics, Molecular Analysis</td>
<td></td>
</tr>
<tr>
<td>Mar 9</td>
<td>Review</td>
<td>18</td>
</tr>
<tr>
<td>Mar 12-16</td>
<td>EXAM II</td>
<td>19</td>
</tr>
<tr>
<td>Mar 20</td>
<td>No Classes: Spring Break</td>
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</tr>
<tr>
<td>Mar 22-24</td>
<td>TACLS Convention</td>
<td>20</td>
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<tr>
<td>Mar 27</td>
<td>Disorders of Primary Hemostasis</td>
<td>21</td>
</tr>
<tr>
<td>Mar 29</td>
<td>Disorders of Secondary Hemostasis</td>
<td>22</td>
</tr>
<tr>
<td>Mar 30</td>
<td>No Classes: Easter Friday</td>
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<tr>
<td>Apr 3</td>
<td>Disorders of Secondary Hemostasis</td>
<td>23</td>
</tr>
<tr>
<td>Apr 5</td>
<td>Hemorrhagic Disorders</td>
<td></td>
</tr>
<tr>
<td>Apr 6</td>
<td>Thrombotic Disorders</td>
<td>24</td>
</tr>
<tr>
<td>Apr 10</td>
<td>Anticoagulant Therapy</td>
<td>25</td>
</tr>
<tr>
<td>Apr 12</td>
<td>New Therapies/Instrumentation</td>
<td></td>
</tr>
<tr>
<td>Apr 13</td>
<td>Flow Cytometry/Data Interpretation/Histograms</td>
<td>26</td>
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<td>Apr 17</td>
<td>No Classes: Easter Holiday</td>
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<td>Apr 19</td>
<td>Body Fluids</td>
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<td>Apr 26</td>
<td>Semen Analysis</td>
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<tr>
<td>Apr 27</td>
<td>Review</td>
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<tr>
<td>May 1</td>
<td>EXAM III</td>
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<tr>
<td>TBA</td>
<td>FINAL</td>
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<tr>
<td>Date</td>
<td>Activities</td>
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</table>
| Jan 16 | Venipuncture: Lecture  
              Lecture: Dummy arms  
              Reticulocyte Stain and Count  
              Differential and White Blood Cells |
| Jan 23 | Venipuncture: Lab partners/Dummy arms  
              Differential and White Blood Cell Precursors |
| Jan 30 | Venipuncture: Lab partners/Dummy arms  
              Differential and White Blood Cell Precursors |
| Feb  6 | Venipuncture: Lab partners/Dummy arms  
              Nucleated RBCs and corrections  
              Differential and White Blood Cell Precursors |
| Feb 13 | Venipuncture: Lab partners/Differentials  
              Osmotic fragility (discuss); Sickle cell test  
              Differential and White Blood Cell Precursors |
| Feb 20 | Venipuncture: Lab partners/Differentials  
              Case Studies for Anemias due |
| Feb 27 | **PRACTICAL I** |
| Mar  6 | Differentials: Leukemia’s  
              Special stains/Lecture and Self study  
              Review |
| Mar 12-16 | **SPRING BREAK** |
| Mar 20 | Differentials: Leukemia’s  
              Venipuncture: Lab partners  
              Case Studies for Leukemia’s due |
| Mar 27 | Differentials: Leukemia’s  
              Histograms/Case study album |
| Apr  3 | Differentials: Leukemia’s  
              FDPs, D-dimer test, Fibrinogen  
              Thrombin time, Bleeding Time  
              PT, PTT/POC and Fibrometer |
| Apr 10 | Body Fluids Video |
| Apr 17 | Body Fluid Differentials |
| Apr 24 | Venipuncture: Lab partners check off  
              Body Fluid Differentials  
              Case studies for Coag due  
              Differentials due  
              Review |
| May  1 | **PRACTICAL II** |