DE ANZA COLLEGE
BIOLOGY, HEALTH SCIENCES AND ENVIRONMENTAL STUDIES DIVISION
COURSE OUTLINE - **FALL 2022**

HTEC 80A **Clinical Hematology Lecture** **4.5 units**
Co-requisite: HTEC 80 (Clinical Hematology Laboratory)

4.5 hour lecture

Instructor: Thuy Vo Pinheiro, MHA, MT(ASCP)SH, CLS
Class hours: Mondays, 05:30 PM – 9:45 PM
Office hours: After class online or via emails
Phone/Voicemail: (408) 864 – 8790 , email is best.
Fax Telephone: Scan copy to email
Office Location: Online & school email
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Course Description: This course presents the origin of the various types of blood cells with emphasis on the red and white blood cells. The student will learn about human hematological disorders and classify these based on clinical laboratory findings. Admission to the MLT Program is necessary prior to registration. Successful completion of this course HTEC 80A and HTEC 80, HTEC 81A, HTEC 81, HTEC 82 and HTEC 82A is required to enroll in Clinical Hematology/Urinalysis/Coagulation Practicum, HTEC 180.

Hematology Text:
McKenzie, S, Landis-Piwowar, K, Williams, J.L. (2020). Clinical Laboratory Hematology, 4th Edition: Pearson.
Keohane, E, Otto, C, Walenga, J, (2020). *Rodak's Hematology, Clinical Principles and Applications*, 6th Edition. St. Louis: Elsevier Saunders.

Reference Books:
Anderson Young, S and Poulsen, K (2021), Anderson's Atlas of Hematology, 3rd edition, Burlington: Jones & Bartlett Learning.

Glassy, Eric F. (2018). *Color Atlas of Hematology, An Illustrated Field Guide Based on Proficiency Testing*, 2nd edition, Northfield: College of American Pathologists (CAP).

Carr, J & Rodak, FB (2017). *Clinical Hematology Atlas*, 6rd edition. St. Louis: Elsevier Saunders.

Immunizations:
- Hepatitis B – first 2 shots.

Dates of Importance:

Last day to add or drop a student is **Saturday October 8**. (end of second week of classes). Also last day for student refunds.
Last day for the student to drop with no grade of record or no "W" is **Sunday October 9** (for 12-week classes)

Last day for students to drop with a "W": **Friday November 18**. After this date all students MUST get a grade.
THERE ARE ABSOLUTELY NO LATE ADDS OR LATE DROPS or LATE WITHDRAWALS.

Lecture Format:

- Lectures are **synchronous**, **online, and mandatory** with video conferencing platform as:
  - Zoom Meetings in Canvas
  - Students must attend online lectures.
  - Resources are available online at https://www.deanza.edu/resources/

Attendance:

With a no-show student, for the first-class meeting **IT IS THE INSTRUCTOR's RESPONSIBILITY TO DROP the student. **

* Attendance is mandatory. Missed attendances will lead to a drop and the Division Dean and/or Program Coordinator will be notified.
* Missed lectures and exams cannot be made up. With a legitimate excuse, approval by either the instructor or the program director and only if initiated by you, you may receive the lecture notes for the day. You will be responsible for the material on all exams and quizzes.
* Excessive tardiness, performance problems, apparent misconduct will have adverse effects on grades.
* Any unexcused absence results in an automatic drop from this course.

Class rules:

No unauthorized recording, dissemination, and publication of academic presentations or materials including exam materials. This prohibition applies to a recording made in any medium, including, but not limited to, handwritten or typewritten class notes is prohibited in this class.

No recording, videotaping, or taking photos of slides is allowed without the expressed permission of the instructor.

Student Accountability: There is a zero-tolerance policy for any cheating, plagiarism, disruptive or inappropriate behavior, individuals wandering into the classroom or behavior that would lead a reasonable person to assume that these actions have taken place. Anyone observing such behavior should report it to a faculty member at once. Anyone found by a faculty member to have committed plagiarism or to have cheated (or given the appearance of having done either), will be failed or given a zero to tests/quizzes/exams/assignments/homework, and will be reported to the Dean of Students for possible disciplinary action.

Exam rules:

1. Exam will be online via Canvas for all sessions preferably with webcam enabled.
2. The exam is being proctored until the due time.
3. Exam is not open book.
4. Exam is time limit. Use restroom break PRIOR to exam.
5. Questions are shown one question at a time.
6. Each question is locked after answering. No point is awarded for missed answer.

7. Once you have submitted an answer, you will not be able to change it later. You will not be able to view the previous question.
8. For multiple-choice questions, choose the best answer from the given choices of answers per question.
9. Exam is not repeated for credit.
10. Have your camera on and microphone muted during the exam
11. Pop quizzes may be given at any time during class. No make up for pop quizzes.

HTEC 80A - STUDENT LEARNING OUTCOME
Given patient history information and laboratory results, identify the hematological disorder displayed by the patient.

You may access your final grades through the Banner System.

HTEC 80A – Clinical Hematology Lecture: Cognitive Objectives
After attending the Clinical hematology lectures, reading the assigned chapters and completing the homework, the student will:

HTEC 80A – Clinical Hematology – Course Introduction:

1. State the number of exams given throughout this course and the required % score needed to pass this class
2. Locate in the course syllabus the "important dates to note" section

Hematopoiesis & Erythropoiesis:

1. Explain the study of hematology and summarize its basic concepts and basic morphologies
2. Investigate Hematopoiesis in the human fetus, newborn and adult
3. Evaluate RBC metabolism as it relates to the RBC membrane, hemoglobin structure and function and RBC metabolic pathways
4. Compare and contrast erythrocyte maturation in its various stages of normal and abnormal development.
5. Iron absorption and metabolism
6. Vitamin B12 absorption and metabolism

Anemias:

1. Distinguish between the various anemias and correlate cell morphology and laboratory test values for each type
2. Given CBC results, categorize and anemia according to morphologic classification
3. Correlate patient history and clinical symptoms with laboratory results in anemia
4. Determine the clinical significance of erythrocyte inclusions and select methods to differentiate the inclusions
5. Given laboratory results, classify an anemia in terms of morphology and function
6. Compare and contrast iron stores, hemoglobin, serum iron, TIBC, saturation, serum ferritin, and RBC morphology in the three stages of iron deficiency
7. Contrast the basic defects in iron deficiency anemia, sideroblastic anemia, and anemia of chronic disease and describe how these defects affect hemoglobin synthesis

8. Correlate the flowing lab features with iron efficiency anemia: erythrocyte protoporphyrin studies, iron studies, bone marrow
9. Select laboratory tests and discuss test results that help differentiate iron deficiency anemia, anemia of chronic disease and sideroblastic anemia
10. Summarize the process of vitamin B12 and folic acid metabolism and explain how a deficiency can result in megaloblastosis
11. Compare and contrast the various clinical forms and causes of vitamin B12 and folate deficiency on the basis of clinical symptoms and laboratory results
12. Categorize the causes and clinical variations of pernicious anemia
13. Compare and contrast the various clinical forms and causes of folic acid deficiency
14. Evaluate a case study from a patient with anemia. Determine from the medical history and laboratory results, the most probable diagnosis
15. List and explain the probable causes of aplastic anemia
16. Contrast aplastic anemia with other causes of pancytopenia on the basis of clinical findings and peripheral blood and bone marrow findings
17. Evaluate laboratory test results and medical history of a clinical case for a patient with hypo-proliferative anemia and suggest a possible diagnosis
18. Compare and contrast the processes of intravascular and extravascular hemolysis and explain how laboratory results can be used to differentiate
19. Describe the Pathophysiology and recognize laboratory features associated with hereditary spherocytosis and hereditary elliptocytosis
20. Describe the etiology, Pathophysiology, and laboratory features of paroxysmal nocturnal hemoglobinuria (PNH)
21. Correlate clinical and laboratory findings with the common G6PD isoenzyme variants
22. Given a set of laboratory data, determine the underlying mechanism of hemolysis and suggest confirmatory tests.
23. Contrast the different mechanisms of drug-induced immune hemolytic anemia.
24. Compare the prenatal and postnatal Pathophysiology of hemolytic disease of the newborn.
25. Describe the general morphology and hematologic values associated with MAHA and criteria that distinguish disseminated intravascular coagulation thrombotic thrombocytopenic purpura and hemolytic uremic syndrome

Hemoglobinopathies & Thallassemias

1. Compare the synthesis and concentration of abnormal hemoglobins in homozygous and heterozygous conditions
2. Compare and contrast the Pathophysiology of hemoglobin variants in terms of altered solubility, function and stability
3. Contrast clinical findings in persons who are homozygous and heterozygous for hemoglobins S, C, E and D and in those who are compound heterozygotes for theses abnormal hemoglobins
4. Evaluate and interpret mobility patterns obtained on cellulose acetate and citrate agar gel hemoglobin electrophoresis when structurally abnormal hemoglobins are present
5. Evaluate and interpret tests used in detecting and identifying abnormal hemoglobins
6. Evaluate laboratory test results and medical history of a clinical case for a patient with a hemoglobinopathy and suggest a possible diagnosis
7. List and describe the 5 genetic defects found in thalassemia
8. Compare and contrast ά and β thalassemia
9. Correlate the outcomes in hemoglobin synthesis resulting from the five genetic effects in thalassemia

10. Differentiate thalassemia from hemoglobinopathies based on definition and basic Pathophysiology
11. Explain advanced Pathophysiology, describe treatment and prognosis and list expected genotypes for al four genotypes of ά and β thalassemia
12. Differentiate iron deficiency anemia and HPFH from thalassemia based on results of laboratory tests and clinical findings

Quality Assurance:

1. Explain the importance of the CLIA guidelines in laboratory quality
2. Differentiate quality approaches in laboratory and the hematology department
3. Summarize quality control and quality assurance as it applies to the hematology department of the clinical laboratory
4. Interpret the Westgard rules and use in evaluating quality control results
5. Match quality control terms mentioned in lecture with their meanings

Leukocytes, Platelets: Morphology, Maturation and Function:

1. Compare and contrast leukocyte maturation in its various stages of normal and abnormal development, including distinguishing maturation and cell features, of the granulocytic, monocytic-macrophage and the lymphocytic cell lines
2. Examine specific changes in leukocyte morphology, number and function in relation to diagnosis of disease
3. Differentiate morphologically and immunologically the precursors found in the proliferative compartment of the bone marrow

Leukemias, Myeloproliferative Disorders, & Myelodysplastic Syndromes:

1. Compare and contrast the general characteristics of the myelodysplastic syndromes (MDS), myeloproliferative disorders (MPD), and acute and chronic leukemias
2. Differentiate between the acute and chronic leukemias based on their clinical and hematologic findings
3. List the various methods used for categorizing the leukemias
4. Compare and contrast the laboratory findings of the acute and chronic leukemias
5. Compare and contrast the various presentations of AML
6. Describe and recognize the typical peripheral blood picture (erythrocytes, leukocytes, and Thrombocytes) seen in AML
7. Describe the M:E ratio in bone marrow in acute leukemia (AL)
8. Differentiate blasts found hematopoietic neoplasms
9. Compare WHO and FAB classifications of AML
10. Describe and recognize the typical peripheral blood picture (erythrocytes, leukocytes, and Thrombocytes) seen in ALL
11. Identify the major cell lines involved with the various myeloproliferative disorders (MPD), chronic myelocytic leukemia (CML), polycythemia vera (PV), essential thrombocythemia (ET), myelofibrosis with myeloid metaplasia (MMM) and other MPDs.
12. Describe and recognize the peripheral blood findings in MPD patients
13. Define myelodysplastic syndromes (MDS) and list general characteristics and identify key morphological criteria that distinguish each subgroup.

Plasma Cell Dyscrasia, Lymphoid neoplasm & Lipid Storage Disorders

1. Compare and contrast the laboratory features characteristic of the following non-Hodgkin lymphomas:
    a. Small lymphocytic lymphoma
    b. Follicular lymphoma
    c. Mantle cell lymphoma
    d. Diffuse large B cell lymphoma
    e. Burkitt lymphoma
    f. Peripheral T cell lymphoma
    g. Other non-Hodgkin lymphomas
2. Compare and contrast the laboratory features characteristic of the following chronic leukemic lymphoproliferative disorders:
    a. Chronic lymphocytic leukemia
    b. Prolymphocytic leukemia
    c. Hairy cell leukemia
    d. Large granular lymphocyte leukemia
    e. Sezary syndrome
3. Compare and contrast the laboratory features characteristic of the following plasma cell disorders:
    a. Monoclonal gammopathy of undetermined significance
    b. Plasma cell myeloma (multiple myeloma)
    c. Plasmacytoma
    d. Immunoglobulin deposition diseases
    e. Other plasmacytoid diseases
4. Recognize and identify the peripheral blood abnormalities associated with CLL, PLL, HCL, LGLL, Sezary syndrome, multiple myeloma, and non-Hodgkin lymphoma.
5. Distinguish Hodgkin lymphoma and non-Hodgkin lymphomas.
6. Evaluate the etiology, laboratory findings and clinical features of the lipid storage disorders.
7. Identify and differentiate the abnormal macrophages seen in Gaucher disease, Niemann-Pick disease, and sea-blue histiocytosis.

GRADING PROCEDURE

Pop quizzes may be given unannounced at any time during the class and they are only available during those times. No make-up for missed pop quizzes.

Exam I: 150 pts
Exam II: 150 pts
Final exam: 200 pts
Power Point Presentation – Group project: 20 points
*** Points may be subject to change**
Grades are calculated on cumulative percentage and are rounded up whenever possible.

90 – 100%	**A**
80 – 89%	**B**
75 – 79%	**C**
65 – 74%	**D**
64% and below	**F**

CLINICAL HEMATOLOGY LECTURE SCHEDULE

FALL 2022

#	DATE	TOPIC	Readings (Chapters)
1	9/26	Introduction, Hematopoiesis, Erythropoiesis	2-6
2	10/3	Anemias	11-12, 15-20
3	10/10	Anemia (cont'd), Hemoglobinopathies, Thalassemia	13-14
4	10/17	**EXAM I**	Review
5	10/24	QA & Leukocytes, Platelets: Morphology Maturation, and Function	7-9
6	10/31	Acute Leukemias	26-27
7	11/07	Myeloproliferative Disorders, Myelodysplastic Syndromes	24-25
8	11/14	**EXAM II**	Review
9	11/21	Lymphoid Neoplasms	28
10	11/28	Plasma Cell Dyscrasia Hodgkin's Lymphomas, Lipid Storage Disorders,	28 (pg 634 – 635, 640)
11	12/5	Group Presentation - Class Review	
12	12/12	**Cumulative Final Exam**	Review

Group Presentation – Class Review (20 points)

Select members of the groups. Group size and the time limit for each student depend on the class size. Each student gets a 2-3 minutes presentation on his/her part of the team presentation. Individual presentation of >4 minutes will get point deduction. Zero point for no participation of group presentation.

- Assigned topics serve as review for the final exam.
- Presentation can be in the form of case study questions, skits, multiple choice questions or any creative way to help class review the lecture materials.
- Each group will be randomly assigned a topic by mid-quarter.

Team forming process:

1) Start to form a team by the 6th week.
2) Brainstorm with team members about the team subject.
3) Determine the shared and agreed responsibilities of each team member.
4) Once obtained the assigned topic from instructor, start the project as soon as possible.
5) Group presentation is on the 11th week of class, one week before the final exam.
6) On the day of presentation, submit the following:
   a. The presentation outline which includes the assigned topic, the name of team members and their shared responsibilities.
   b. A summary chart that lists all main characteristics, compare and contrast characteristics to distinguish hematological disorders within the group of disorders of your group presentation.
7) At the end, the group is responsible to answer questions from the class and the instructor.

On the final exam day, the instructor will provide an individual team evaluation form.

- ❖ The individual team evaluation is the opportunity for each team member to express his or her experience in teamwork, evaluate his/her share of responsibilities of teamwork, and evaluate each team member's contribution in the project.
- ❖ The team evaluation is only for instructor's use to assess the students' teamwork and will be anonymous to other students.

Grade includes 10 pts for 2-min presentation, 5pts for summary chart, and 5pts for team work evaluation.

Grade will be based on:

- ☑ Relevance to Hematology
- ☑ Content of summary chart
- ☑ Timeliness (point deduction if exceed time limit)
- ☑ Originality
- ☑ Creativity

I am looking forward to your presentations!