Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UNIVERSITY of MEDICALS &

APPLIEED SCIENCES

Faculty of Laboratory medicine..

Department of Hematology

Course Specification of **Hematology II (Hemoglobin Biosynthesis)**

Course No. (03,03,335)
2022/2023

2- Course name: Hematology II (Hemoglobin Biosynthesis)

I. Course Identification and General Information:					
1	Course Title:	Hematology II (Hemoglobin Biosynthesis)			
2	Course Code & Number:	03,03,335			
3	Credit Hours:	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	2	3
4	Study Level/ Semester at which this Course is offered:	2nd Level / 2nd Semester			
5	Prerequisite (if any):	Hematology I			
6	Co –Requisite (if any):	Non			
7	Program (s) in which the course is offered:	Bachelor in laboratory medicine			
8	Language of Teaching the Course:	English			
9	Study System:	semester			
10	Mode of Delivery:	Regular			
11	Location of Teaching the Course:	University Campus			
12	Prepared by:	Dr. Dr. bushra alabsi			
13	Date of Approval:	2022-2023			

	A. Course Description:
	The course provides knowledge about oxygen dissociation curve, heme synthesis, porphyria, types of

	normal hemoglobin, catabolism of red blood cells, hemoglobin variants, metabolism and membrane structure of red blood cells.

III. Course Intended Learning Outcomes (CILOs)		**Referenced PILOs**
	A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:	
a1	Describe the factors affecting oxygen dissociation curve.	**A1**
a2	Recognize the heme synthesis steps and its disorders.	**A2**
a3	Understand the different tests of hemoglobin estimation.	**A3**
	B. Intellectual Skills: Upon successful completion of the course, students will be able to:	
b1	Perform complete blood count (CBC) and hemoglobin electrophoresis.	**B1**
b2	Recognize errors or discrepancies in results during lab procedures.	**B2**
	C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:	
c1	Demonstrate ethical and professional behavior, interest, enthusiasm, and willingness to learn as seen through active participation.	**C1**
c2	Act responsibly and reliably as measured by punctuality, attendance, dependability, and quality of work.	**C2**
	D. Transferable Skills: Upon successful completion of the course, students will be able to:	
d1	Relate complete blood count (CBC)	**D1**

C. Alignment Course Intended Learning Outcomes with Teaching Strategies and Assessment methods:			
(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	Describe the factors affecting oxygen dissociation curve	Lectures,	Exams
a2	Recognize the heme synthesis steps and its disorders.	Lectures	Exams

a3	Understand the different tests of hemoglobin estimation.	Lectures	Exams
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	Perform complete blood count (CBC) and hemoglobin electrophoresis.	Lectures	exam
b2	Recognize errors or discrepancies in results during lab procedures.	Lectures	exam
(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1	Demonstrate ethical and professional behavior, interest, enthusiasm, and willingness to learn as seen through active participation.	practical Lectures	Practical exam
c2	Act responsibly and reliably as measured by punctuality, attendance, dependability, and quality of work.	practical Lectures	Practical exam
(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	Relate complete blood count (CBC)	Lectures, Laboratory practical,	Seminars

IV . Course Content:					
A – Theoretical Aspect:					
NO.	**Units/Topics List**	**Subtopics List**	**Number of Weeks**	**Contact hours**	**Learning Outcomes (CILOs)**
1	Oxygen dissociation curve		1	2	a1, b1
2	The Bohr effect, Haldane effect and Adjustments in Hemoglobin-O2 Affinity		1	2	a1, b2
3	Heme synthesis		1	2	a2, , b2
4	The role of iron in hemoglobin synthesis		1	2	b1, b2, c1
5	Factors control iron absorption and its plasma level, globin structure and synthesis		1	2	a2, a3, b2
6	Mid-term exam		1	1	
7	Disorders of heme synthesis (porphyria)		1	2	a2, b1 , d1
8	Ontogeny of hemoglobin: embryonic Hemoglobin, fetal Hemoglobin (Hb F), Hemoglobin A and glycosylated hemoglobin	embryonic Hemoglobin, fetal Hemoglobin (Hb F), Hemoglobin A and glycosylated hemoglobin	1	2	a3, b1, c1
9	Variant forms of normal hemoglobin: Carboxyhemoglobin Sulfhemoglobin Methemoglobin Abnormal Hemoglobin Molecules	Carboxyhemoglobin Sulfhemoglobin Methemoglobin Abnormal Hemoglobin Molecules	1	2	a3, b1, d1
10	Analysis of Hemoglobin		1	2	a2,b1, b2, c1
11	Catabolism of Erythrocytes: extravascular and intravascular		1	2	a2, a3, b1
12	Red blood cell metabolism: Embden–Meyerhof pathway Hexose monophosphate shunt		1	2	a2, a3, b2
13	Composition of Red cell membrane		1	2	a3, b1, c1
14	Final Theoretical				
	Number of Weeks /and Units Per Semester		**14**	**25**	

B - Practical Aspect: (if any)				
Order	**Tasks/ Experiments**	**Number of Weeks**	**Contact hours**	**Learning Outcomes**
1	Blood film report	2	2	c1
2	Reticulocyte count	2	2	c2
3	Sickling test	1	2	c2
4	Hb F estimation	1		
5	Osmatic fragility test	1	2	c1, c2
6	Iron profile study (Serum iron and TIBC)	2	2	c1, c2
7	G6PD test	1	2	c2
8	Hemoglobin electrophoresis	2	2	c1, c2
9	Final practical exams	**2**	**1**	
Number of Weeks /and Units Per Semester		**12**	**15**	

V. Teaching Strategies of the Course:	
1-	Lectures:
2-	practical session
3-	Seminars

VI. Assessment Methods of the Course:	
No	**Assignment**
1	Written Exams (Short Essays) and Quizzes
2	Multiple Choice Questions (MCQ)
4	Practical Exams (PE)

VII. Assignments:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes

1	**Midterm Exam**	8	20	20%	a1,a2,a3,b1,b2,c1
2	**Practical exam**	12	30	30%	a1,a2,b1,b2,c1,c2,d1
3	**Final Exam**	16	50	50%	a1,a2,b1,b2,c1
	Total		100	100%	

VIII. Learning Resources:	
1- Required Textbook(s).	
1-	A. Victor Hoffbrand- 2016- Hoffbrand's Essential Hematology- Seventh edition
2-	Mary Louise Turgeon – 2018- Clinical Hematology- Sixth edition Dacie and Lewis Practical Haematology, Twelfth Edition • 2017
2- Essential References.	
1-	Shirlyn McKenzie, Kristin Landis-Piwowar, Linne Williams (2019). Clinical Laboratory Hematology, 4th Edition, Pearson Publishers. ISBN-13: 978-0134709390; ISBN-10: 013470939X
2-	
3- Electronic Materials and Web Sites *etc*.	
1-	https://www.britannica.com/science/blood-biochemistry
2-	https://en.wikipedia.org/wiki/Blood

X. *Course Policies:*	
1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** -If the student dose not attend for more than 6 times, the student will be obligated to withdrew from the course
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time and shall not leave the hall before half of the exam time has passed.

4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration