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 Advanced Genetics of Hematology
Course No. (03.13. 321)
2022/2023

Prepared by:	Reviewed by.	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
Dr\ Nawal Al- Henhena	Dr\ Nabil Alowiri	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:					
1	**Course Title:**	Advanced genetics of hematology			
2	**Course Code & Number:**	03.13. 321			
3	**Credit Hours:**	**Theory Hours**			
		Lecture	**Exercise**	Practical	**Credit Hours**
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 2nd Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Medical Diagnostic Hematology			
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\ Nawal Al- Henhena			
13	**Date of Approval:**	2022-2023			

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
Dr\ Nawal Al- Henhena	Dr\ Nabil Alowiri	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

II. Course Description:
This course is designed to provide advanced knowledge and understanding of the molecular genetic basis of hematological disorders. Students will learn about the latest research and advancements in the field of molecular genetic hematology, including the identification and characterization of genetic mutations that contribute to the development and progression of hematological disorders.

III. Alignment Course Intended Learning Outcomes with program outcomes

	III. Course Intended Learning Outcomes (CILOs)	Referenced PILOs
A. Knowledge and Understanding: ***Upon successful completion of the course, students will be able to:***		
a1	**Understand** the molecular genetic basis of hematological disorders, including the identification and characterization of genetic mutations that contribute to the development and progression of hematological disorders	A1
B. Intellectual Skills: ***Upon successful completion of the course, students will be able to:***		
b1	**Analyze** the interplay between genetic and environmental factors in the pathogenesis of hematological disorders.	B1
C. Professional and Practical Skills: ***Upon successful completion of the course, students will be able to:***		
c1	**Evaluated** research plan based on the latest research and advancements in the field	C1
D. Transferable Skills: ***Upon successful completion of the course, students will be able to:***		
d1	**Communicate** effectively about hematological disorders to patients, colleagues, and the public	D1

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IV. 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	**Understand** the molecular genetic basis of hematological disorders, including the identification and characterization of genetic mutations that contribute to the development and progression of hematological disorders	Lecture	Exam
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Analyze** the interplay between genetic and environmental factors in the pathogenesis of hematological disorders.	Lecture	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	**Evaluated** research plan based on the latest research and advancements in the field	Lecture Discussion Presentation	Exam Discussion Presentation
(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	**Communicate** effectively about hematological disorders to patients, colleagues, and the public	Lecture Discussion Presentation	Exam Discussion Presentation

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
Dr\ Nawal Al- Henhena	Dr\ Nabil Alowiri	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
1	Introduction to Molecular Genetic Hematology:	Basic concepts and definitions, history of molecular genetic hematology, and overview of the course.	2	4	a1,b1,c3,d1
2	The Genetics of Hematological Disorders	○ Mendelian inheritance ○ Chromosomal disorders	1	2	a1,b1,c3,d1
3	Hematopoiesis and Hematopoietic Stem Cells:	Mechanisms of hematopoiesis, regulation of hematopoietic stem cells, and their role in the development of hematological disorders.	2	4	a1,b1,c3,d1
4	Genetic Basis of Hematological Disorders:	Role of genetic mutations in the development and progression of hematological disorders, including anemias, leukemias, lymphomas, and myeloproliferative disorders.	1	2	a1,b1,c3,d1
5	Inherited Hematological Disorders:	Molecular basis of inherited hematological disorders, including thalassemia, sickle cell anemia, and hemophilia.	2	4	a1,b1,c3,d1
6	Acquired Hematological Disorders:	Molecular basis of acquired hematological disorders, including myelodysplastic syndromes and	2	4	a1,b1,c3,d1

		myeloproliferative neoplasms.			
7	Epigenetics and Hematological Disorders:	Role of epigenetic modifications in the development and progression of hematological disorders.	1	2	a1,b1,c3,d1
8	Hematological Oncogenomics:	Applications of genomics and transcriptomics in the study of hematological disorders, including identification of new therapeutic targets and development of personalized medicine.	1	2	a1,b1,c3,d1
9	Hematological Immunology:	Role of the immune system in the pathogenesis of hematological disorders, including autoimmune hemolytic anemia and immune thrombocytopenia.	1	2	a1,b1,c3,d1
10	Stem Cell Transplantation:	Role of stem cell transplantation in the treatment of hematological disorders, including allogeneic and autologous stem cell transplantation.	1	2	a1,b1,c3,d1
11	Research and Developments in Molecular Genetic Hematology:	Current research and developments in the field of molecular genetic hematology, including new tools, technologies, and approaches.	1	2	a1,b1,c3,d1
12	Final exam		1	2	a1,b1,c3,d1
Number of Weeks /and Units Per Semester			16	**32**	

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V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self-leaning
4-	**Group discussion**
	Case study analysis

VI. Assessment Methods of the Course:	
No	**Assignment**
1	**Written Exams (Essays) and Quizzes**
2	Structured Oral Exams
4	Objective Structured Practical Exams (OSPE)
5	Student presentation
6	Case study analysis

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	**Activity**	Throughout the semester	10	10%	a1,a2,b1,c3,d1
3	Practical Report	Throughout the semester	10	10 %	a1,a2,b1,c3,d1
4	**Practical exam**	12	20	20%	a1,a2,b1,c3,d1
5	**Final Exam**	14	60	60%	a1,a2,b1,c3,d1
Total					

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Learning Resources:
• *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*
1- Required Textbook(s) (maximum two).
Clinical Biochemistry: An Integrated Approach, 7th Edition by William M. Brown and David A. Marks Clinical Chemistry: A Laboratory Handbook, 7th Edition by John W. Baynes and Michael J. Dominiczak
2- Essential References.
Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 6th Edition by Burt Hirschhorn and Robert A. McPherson Devlin's Textbook of Biochemistry with Clinical Correlations: Martin D. Snider John Wiley & Sons, Incorporated, Oct 9, 2024 - 1448 pages
Web
1- http://www.biology.arizona.edu/biochemistry/biochemistry.html
2- **GENERAL BIOCHEMISTRY:** http://web.indstate.edu:80/thcme/mwking/
3- **MEDICAL BIOCHEMISTRY** http://www.kumc.edu/research/medicine/biochemistry/bioc800/opening.html
4- https://pubmed.ncbi.nlm.nih.gov/

XI. *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:**

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
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	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

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21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIEED

SCIENCES

Faculty of Laboratory Medicine.

Department of Hematology
Course Specification of **Advanced Biochemistry**
Course No. (03.13.320)
2022 /2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr. Nawal Al- Henhena	Dr. Ebtesam Al-Zabedi	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:					
1	**Course Title:**	Advanced Biochemistry			
2	**Course Code & Number:**	**03.11.320**			
3	**Credit Hours:**	**Theory Hours**			
		Lecture	**Exercise**	Practical	**Credit Hours**
		2	0	0	2
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 2nd Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Biochemistry and Molecular biology			
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. Nawal AL-Henhena			
13	**Date of Approval:**	2023			

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr. Nawal Al- Henhena	Dr. Ebtesam Al-Zabedi	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

II. Course Description:

The focus is on the regulation of sugar and fat metabolism in eukaryotes, with an emphasis on human. The course will begin with a review of carbohydrate and lipid metabolic pathways, particularly pathway integration and regulation. We will then progress to an in-depth analysis of current research in specific areas of sensing, signaling and metabolic regulation.

III. Alignment Course Intended Learning Outcomes with program outcomes

	III. Course Intended Learning Outcomes (CILOs)	Referenced PILOs
A. Knowledge and Understanding: *Upon successful completion of the course, students will be able to:*		
a1	**Demonstrate** knowledge and understanding of the principles of the regulation and integration of macromolecules metabolic pathways and signal transduction	**A1**
B. Intellectual Skills: *Upon successful completion of the course, students will be able to:*		
b1	**Explain** the metabolic pathways and signal transduction relation to diseases	**B2**
C. Professional and Practical Skills: *Upon successful completion of the course, students will be able to:*		
c1	**Apply** theoretical and practical aspects of mechanisms of regulation.	**C1**
D. Transferable Skills: *Upon successful completion of the course, students will be able to:*		

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr. Nawal Al- Henhena	Dr. Ebtesam Al-Zabedi	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

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	**Demonstrate** knowledge and understanding of the principles of the regulation and integration of macromolecules metabolic pathways and signal transduction s	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	**Explain** the metabolic pathways and signal transduction relation to diseases	Lectures	Exams, Assignments.
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	**Apply** theoretical and practical aspects of mechanisms of regulation.	Lectures Practical sessions	Lab reports, Exams
(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	**Metabolism of carbohydrates** **Metabolism of lipids** **Metabolism of proteins**	Glycolysis ,Krebs's cycle , B-oxidation, ketogenesis and, cholesterol metabolism, Amino acid metabolism, Urea cycle,	12		**a1,,b1,c1**
2	**Regulation of metabolism**	Regulation of carbohydrates metabolism in muscles, adipose tissues and liver Regulation of lipid metabolism in adipose tissues and liver Regulation of protein metabolism and nucleic acid	**2**	**2**	**a1,,b1,c1**
3	**Metabolic integration**	The co-ordination between three metabolites (carbohydrates, lipid, and proteins). Cellular Respiration	2	4	**a1,,b1,c1**
4	**Inborn Errors of Metabolism**	Diseases enzymes and genes, defects in enzyme synthesis, genetic heterogeneity, pathogenic mechanism in inherited metabolic diseases, diagnosis of inherited metabolic diseases	3	6	**a1,,b1,c1**
5	**Molecular aspects of signal transduction**	Signaling mediated-processes; Intracellular receptors (steroid hormones), cell-surface receptors (cAMP and calcium).	2	4	**a1,,b1,c1**
6	**Regulation of cAMP concentration by hormones**	Adenylate cyclase, phosphodiesterase, G-protein, mechanism of action of cAMP, specificity of cAMP-dependent protein kinase, structure and mechanism of action of the protein kinase	**1**	**2**	**a1,,b1,c1**
7	**Final Exam**		**1**	**2**	**a1, b1,c1**
Number of Weeks /and Units Per Semester			**16**	**32**	

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Dr. Nawal Al- Hemhena	Dr. Ebtesam Al-Zabedi	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self-leaning
4-	**Group research**

VI. Assessment Methods of the Course:

No	Assignment	
1	**Written Exams (Short Essays) and Quizzes**	
2	Written Exams(MCQ)	
3	Structured Oral Exams	
4	Objective Structured Practical Exams (OSPE)	
5	Student presentation	

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	**Activity**	Throughout the semester	20	20%	**a1,,b1,c1**
5	**Final Exam**		80	80%	**a1,,b1,c1**
Total			**100**		

Learning Resources:
• *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*
1- Required Textbook(s) (maximum two).
Devlin, T.M., John Wiley & Sons, (2011) , Biochemistry with Clinical Correlations -7th ed., Inc. (New York), ISBN: 978-0-470-28173-4.
2- Essential References.
1- Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292-3414- 8. 2- Nelson, D.L. and Cox, M.M. Lehninger Principles of Biochemistry (8th Edition, 2021).
3- Electronic Materials and Web Sites *etc.*
1- Metabolism – clinicaland Experimental: https://metabolismjournal.com 2- The World Health Organization (WHO): https://www.who.int/

XI. *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

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr. Nawal Al- Hehhena	Dr. Ebtesam Al-Zabedi	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

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Ministry of Higher Education & Scientific Research

21 SEPTEMBER UNIVERSITY of MEDICALS &

APPLIEED SCIENCES

Faculty of Laboratory medicine..

Department of Hematology

Course Specification of Research Methodology

Course No. (03.13. 319)

2022/2023

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	. Dr Ghamdan Al-Tahish	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:						
1	**Course Title:**	Research Methodology				
2	**Course Code & Number:**	03.13. 319				
3	**Credit Hours:**	**Theory Hours**				
		Lecture	**Exercise**	Practical	**Credit Hours**	
		2	0	2	3	
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 1st Semester				
5	**Pre –Requisite (if any):**	None				
6	**Co –Requisite (if any):**	None				
7	**Program (s) in which the Course is Offered:**	Master Degree Medical Diagnostic Hematology				
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:**					
13	**Date of Approval:**	2022-2023				

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	. Dr Ghamdan Al-Tahish	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

II. Course Description:
This course will introduce students to the principles of research methodology and biostatistics. Students will learn how to design and conduct research studies, collect and analyze data, and interpret the results of statistical analyses. The course is designed for students who are interested in pursuing a career in research, control, or teaching related to health sciences

III. Alignment Course Intended Learning Outcomes with program outcomes

	III. Course Intended Learning Outcomes (CILOs)	Referenced PILOs
A. Knowledge and Understanding: *Upon successful completion of the course, students will be able to:*		
a1	**Understand** specialized research methods and data collection	**a1**
B. Intellectual Skills: *Upon successful completion of the course, students will be able to:*		
b1	**Design** advanced research project autonomously synthesizing the various ethical, statistical, and reporting methods	**b1**
C. Professional and Practical Skills: *Upon successful completion of the course, students will be able to:*		
c1	**Demonstrate** mastery in advanced research methods when write clear and concise research reports.	**c1**
c2	**Applied** advanced ethical issues in research	**c3**
D. Transferable Skills: *Upon successful completion of the course, students will be able to:*		
d1	**Communicate** effectively about Research Methods and Scientific Writing to a variety of audiences	**D1**

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	Dr Ghamdan Al-Tahish	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

IV. 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
a 1	**Understand** specialized research methods and data collection	Lecture	Exam
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Design** advanced research project autonomously synthesizing the various ethical, statistical, and reporting methods	Lecture	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** mastery in advanced research methods when write clear and concise research reports.	Lecture Discussion Presentation	Exam Discussion Presentation
C2	**Applied** advanced ethical issues in research	Lecture Discussion Presentation	Exam Discussion Presentation
(D Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	**Communicate** effectively about Research Methods and Scientific Writing to a variety of audiences	Lecture Discussion Presentation	Exam Discussion Presentation

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	. Dr Ghamdan Al-Tahish	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
1	Introduction to Biostatistics and Research Methodology	•Definitions •Meaning of Descriptive and Inferential Statistics •Population and Sample •Types of Variable •Measurement Scales •Measurement Errors	2	4	a1,b1,c1,c3,d1
2	Presentation of Data	•Presenting data by graphs and tables •Box Plots •Sources of Data	2	4	a1,b1,c1,c3,d1
3	Measure of Central Tendency • Definition of Average and its types	• Definition of Average and its types • A.M, G.M, H.M, Median and Mode • Quantiles • Properties of Mean • Relative merits and Demerits of These averages	2	4	a1,b1,c1,c3,d1
4	Measure of Dispersion	• Absolute and Relative Dispersion • Range • Quartile Deviation • Mean Deviation • Variance • Standard Deviation • Skewness • Kurtosis	1	2	a1,b1,c1,c3,d1

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		• Practicing Exercise (Testing & Numerical)			
5	Probability	Random Experiments Sample Space and Events Different Definitions of Probability	1	2	a1,b1,c1,c3,d1
6	Simple Regression and Correlation	• Regression and Correlation definitions and interpretation • Scatter Diagram • Least Square Method Coefficient of Determination	3	6	a1,b1,c1,c3,d1
7	Sampling	• Definition • Sampling Design and Sampling Frame • Probability and Non-Probability Sampling • Sampling and Non-Sampling Errors • Sampling Distribution of Mean and Variance • Difference of Means	1	2	a1,b1,c1,c3,d1
8	Hypothesis Testing	• Definition • Null and Alternative Hypothesis • Critical region • Type I and Type II error • Level of Significance • P-Value and power of test • Acceptance and Rejection Regions Chi-square, Z-Test and T-Test	3	6	a1,b1,c1,c3,d1
9	Analysis of Variance and Experimental	Analysis of Variance of One-Way and Two- Way Complete Randomized	1	2	a1,b1,c1,c3,d1

	Design	Randomized Complete Block Latin Square Design Factorial Experiments			
10	Screening	•Reliability and Validity of a Screening Test •Sensitivity and Specificity •Predictive values	1	2	a1,b1,c1,c3,d1
11	Final exam		1	2	a1,b1,c1,c3,d1
Number of Weeks /and Units Per Semester			16	32	

V. Teaching Strategies of the Course:

1-	Lectures
2-	Practical session
3-	Self leaning
4-	**Group discussion**
	Case study analysis

VI. Assessment Methods of the Course:

No	Assignment
1	**Written Exams (Essays) and Quizzes**
2	Structured Oral Exams
4	Objective Structured Practical Exams (OSPE)
5	Student presentation
6	Case study analysis

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	. Dr Ghamdan Al-Tahish	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

VII. Assignments:					
No.	**Assignments**	**Week Due**	**Mark**	Proportion of Final Assessment	**Aligned CILOs (symbols)**
2	**Activity**	Throughout the semester	10	10%	a1,a2,b1,c3,d1
3	Practical Report	Throughout the semester	10	10 %	a1,a2,b1,c3,d1
4	**Practical exam**	12	20	20%	a1,a2,b1,c3,d1
5	**Final Exam**	14	60	60%	a1,a2,b1,c3,d1
Total					

Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

1-Robert R. Pagano., 2009 (9th Edition). Study guide understanding Statistics in the Behavioral Sciences. Cengage Learning.
2-Chap T. Le., 2003 (2nd Edition). Introductory Biostatistics. John Wiley & Sons, Inc.

2- Essential References.

1-Indrayan A. and Malhotra R. K., 2012 (3rd Edition). Medical Biostatistics. CRC Press.
2-Qiu, P., 2013 (2nd Edition). Introduction to statistical process control. Chapman and Hall/CRC.

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	. Dr Ghamdan Al-Tahish	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

3-Waqar H Kazmi and Farida Habib Khan., 2014 (1st Edition) Basics in Epidemiology and Biostatistics (Jaypee Publishers)
Wep
4- https://pubmed.ncbi.nlm.nih.gov/

XI. *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:**

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	. Dr Ghamdan Al-Tahish	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

	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

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	. Dr Ghamdan Al-Tahish	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

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 Biomedical Statistics & Epidemiology

Course No. (03,13,318)

2022/2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	Dr\ DrNawal Al-Henheha	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:					
1	**Course Title:**	Biomedical Statistics & Epidemiology			
2	**Course Code & Number:**	03,13,318			
3	**Credit Hours:**	**Theory Hours**			
		Lecture	**Exercise**	Practical	**Credit Hours**
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 1st Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Medical Diagnostic Hematology			
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:**	- Associate Prof. Dr. Ebtesam Al-Zabedi			
13	**Date of Approval:**	2022-2023			

II. Course Description:
This course provides an advanced introduction to the statistical and epidemiological methods used in public health research. Topics include descriptive statistics, probability distributions, parameter estimation, hypothesis testing, sampling techniques, analysis of variance, and correlation. It provides basic training in statistical analysis using statistical software

III. Alignment Course Intended Learning Outcomes with program outcomes		
III. Course Intended Learning Outcomes (CILOs)		**Referenced PILOs**
A. Knowledge and Understanding: ***Upon successful completion of the course, students will be able to:***		
a1	**Understand** the basic concepts of epidemiology and statistical reasoning to public health research	**A1**
B. Intellectual Skills: ***Upon successful completion of the course, students will be able to:***		
b1	**Interpret and explain** appropriate statistical methods to analyze data	**B1**
b3	**Design** and conduct research studies.	**B3**
C. Professional and Practical Skills: ***Upon successful completion of the course, students will be able to:***		
c1	**Interpret** the results of statistical analyses	**C1**
c2	**Perform** statistical software to analyze data	**C3**
D. Transferable Skills: ***Upon successful completion of the course, students will be able to:***		
d1	Communicate the results of statistical analyses to others	**D1**

IV. 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	**understand** and apply the basic concepts of epidemiology and statistical reasoning to public health research	Lecture	Exam
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Identify** and assess causal relationships between exposures and outcomes	Lecture	Exam
B2	**Design** and conduct research studies.	Lecture	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	**Interpret** the results of statistical analyses	Lecture Discussion Presentation	Exam Discussion Presentation
C2	**Perform** statistical software to analyze data	Lecture Discussion Presentation	Exam Discussion Presentation
(D Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	**Communicate** the results of statistical analyses to others	Lecture Discussion Presentation	Exam Discussion Presentation
	Apply ethical and legal principles to the use of epidemiologic data	Lecture Discussion Presentation	Exam Discussion Presentation

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	Dr\ DrNawal Al-Henhena	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

V. Course Content:

A – Theoretical Aspect:

NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	introduction to statistics AND basic statistical concepts	- Overview of biostatistics and epidemiology - Data types and measurement scales - Sampling and bias - Study designs in epidemiology	1	2	a1,b1,b2, b3,c1,c4, d1
2	Descriptive study	Measures of central tendency Measures of dispersion	2	4	
3	Estimation of population	Parametric tests and non-parametric tests, variables, variance			
4	Linear Regression Analysis	- Simple linear regression - Multiple linear regression - Model selection and assumptions - Generalized linear models	2	4	a1,b1,b2, b3,c1,c4, d1
5	Logistic Regression Analysis (	- Binary logistic regression - Multinomial and ordinal logistic regression - Model selection and interpretation - Goodness-of-fit and diagnostics	1	2	a1,b1,b2, b3,c1,c4, d1
8	MED TERM		1	2	a1,b1,b2, b3,c1,c4, d1
9	Introduction to epidemiologic methods	Definition Important	1	2	a1,b1,b2, b3,c1,c4, d1
10	**Descriptive epidemiology**:	Distribution of diseases in populations. measures of disease frequency incidence prevalence methods for describing the distribution of disease in space and time.	3	6	a1,b1,b2, b3,c1,c4, d1
11	**Analytic epidemiology**:	methods for assessing the association between exposures and outcomes, and for	3	6	a1,b1,b2, b3,c1,c4,

X. Learning Resources:	
· *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*	
1- Required Textbook(s) (maximum two).	
1-	• Biostatistics: A Foundation for Analysis in the Health Sciences, 6th Edition by John P. Kleinbaum, Leslie L. Kupper, and Hal Morgenstern.
2-	• Epidemiology: Beyond the Basics, 2nd Edition by Moyses Szklo and F. Javier Nieto.
2- Essential References.	
1-	Maxcy-Rosenau (2010): Public health and preventive medicine, Prentice- Hall International Inc. 15th edition
2-	o Park K. (2007) eighteenth edition: Environment and Health at Park's textbook of preventive and social medicine. Ms Banarsidas Bhanot, ., India.
3-	o R. Beaglehole , R.Bonita and T Kjellström (2006): Basic Epidemiology .
3- Electronic Materials and Web Sites *etc.*	
1-	International Journal of epidemiology
2-	□□ECMA periodicals
3-	□□www. Who. Int
4-	□□www.cdc.org □□www. BMJ.com Centers for Disease Control and Prevention (.gov) https://www.cdc.gov

XI. *Course Policies:*	
1	**Class Attendance:**
	-If the student dose not attend for more than 6 times, the student will be obligated to withdrew from the course
2	**Tardy:**

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Ebtesam Mahdi Al-Zabedi	Dr\ DrNawal Al-Henhena	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

	- If the student is late for the lectures for the 2nd time, he will not be allowed to attend this lecture
3	Exam Attendance/Punctuality:
	- If any student does not attend the exam in the scheduled day, it will consider as a fail for him
4	**Assignments & Projects:**
	- Any student dose not submithis assignment,he will lose its grade.
5	**Cheating:** - ANY STUDENT TRY TO CHEAT IN ANY QUIZ OR EXAM, HE WILL NOT BE ALLOWED TO CONTINUE THE EXAM AND IT WILL CONSIDER AS A FAIL FOR HIM
6	**Plagiarism:**
	- If any student try to plagiarism another student identity, both of them will be convertedto investigation and they might be expelled from the program
7	**Other policies:**
	- Undelivered requirement will not be marked
	- You should leave your dental Chair as clean as possible

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 Cellular and Molecular Biology
Course No. (03.13. 317)
2022/2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Nabil Alowiri	Dr\ Nawal Al-Henhena	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:					
1	**Course Title:**	Cellular and Molecular Biology			
2	**Course Code & Number:**	03.13. 317			
3	**Credit Hours:**	**Theory Hours**			
		Lecture	**Exercise**	Practical	**Credit Hours**
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 1st Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Medical Diagnostic Hematology			
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. Nabil Alowiri			
13	**Date of Approval:**	2023			

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Nabil Alowiri	Dr\ Nawal Al-Henhena	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

II. Course Description:

This course provides an introduction to the principles and techniques of molecular biology and genetics. Topics covered include DNA structure and replication, gene expression, regulation of gene expression, DNA repair, mutagenesis, cloning, and genetic engineering.

III. Alignment Course Intended Learning Outcomes with program outcomes

	III. Course Intended Learning Outcomes (CILOs)	Referenced PILOs
A. Knowledge and Understanding: *Upon successful completion of the course, students will be able to:*		
a1	**Understand** the basic principles of molecular biology and genetics	A1
a2	**Describe** the different methods of molecular cloning and different methods of genetic engineering	A2
B. Intellectual Skills: *Upon successful completion of the course, students will be able to:*		
b1	**Design** and carry out molecular biology and genetic experiments	B1
C. Professional and Practical Skills: *Upon successful completion of the course, students will be able to:*		
c1	**Isolate and purify** DNA and RNA from different sources, check of purity of isolated DNA and RNA, restriction fragmentation and separation of oligos by agarose electrophoresis, RAPD analysis of DNA, cDNA synthesis using PCR, Southern and Northern blotting experiments.	C1
D. Transferable Skills: *Upon successful completion of the course, students will be able to:*		
d1	**Demonstrate** oral and written effective communication skills	

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Nabil Alowiri	Dr\ Nawal Al-Henhena	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

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	Understand the basic principles of molecular genetics and genetic disorders	Lectures	Exams
A2	**Discuss** the genetic variation and genetic diseases, drugs that act on the membrane	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	**Design** and carry out molecular genetic experiments	Lectures	Exams, Assignments

(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	**Isolate and purify** DNA and RNA from different sources, check of purity of isolated DNA and RNA, restriction fragmentation and separation of oligos by agarose electrophoresis, RAPD analysis of DNA, cDNA synthesis using PCR, Southern and Northern blotting experiments.	Lectures Practical sessions	Lab reports, Exams

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
D1	**Demonstrate** oral and written effective communication skills	Lectures Practical sessions	Lab reports, Exams

NO.	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes (CILOs)
1	Introduction to Cell	- An overview of the cell and cell structure - Membrane biology - Major cell functions - Regulation of cell functions	1	2	a1,a2,b1,c1,d1
2	Nucleic acids	- Types of nucleic acids - DNA structure and function - RNA structure, types, and function	1	2	a1,a2,b1,c1,d1
3	Genome organization: from nucleotides to chromatin	- Eukaryotic genome - Bacterial genome and Plasmids - Bacteriophages and mammalian DNA viruses - Mitochondrial genome - Definition of a gene, gene structure, chromosomal organization of genes and noncoding DNA	1	2	a1,a2,b1,c1,d1
4	DNA replication	- Models of replication - Initiation of replication - Elongation of replication - Termination of replication - Proofreading of DNA - DNA replication in prokaryotes and Eukaryotes	1	2	a1,a2,b1,c1,d1
5	Gene expression - Transcription	- Transcription in prokaryotes and eukaryotes - Regulatory region and transcriptional unit of Gene - Inhibitors of transcription - Reverse transcription. - Post-transcriptional processing of RNA: splicing, cap addition and polyadenylation - Polynucleotide phosphorylase.	1	2	a1,a2,b1,c1,d1
6	Gene expression	- General features of the genetic code	1	2	a1,a2,b1,c1,d1

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	- **Translation and Post-translational modifications**	- Ribosome as the site of protein synthesis - Activation of amino acids - Initiation, elongation and termination of protein synthesis in prokaryotes and eukaryotes - Fidelity of protein synthesis - Bioenergetics of protein synthesis - Control of translation. - Post-translational processing of the polypeptide chains - Acylation, methylation, phosphorylation and glycosylation.			
7	**DNA repair and mutations**	- General classes of DNA damage - Mechanisms of DNA repair - Types of mutations and their phenotypic consequences	1	2	**a1,a2,b1,c1,d1**
8	Molecular biology techniques - **Analysis of Individual DNA and RNA Sequences**	- Molecular Cloning - Restriction Enzymes - Vectors - Plasmids - Libraries - Screening Libraries with Nucleic Acid - Probes	2	4	a1,a2,b1,c1,d1
9	Molecular biology techniques - **Methods of Nucleic Acid Analysis and Proteins**	- Southern Blotting - Northern or RNA Blotting - Western Blot Analysis of Proteins	1	2	**a1,a2,b1,c1,d1**
10	Molecular biology techniques - **The Polymerase Chain Reaction (PCR)**	- Conventional PCR - Modifications of PCR method - RT-PCR - Gel Electrophoresis - Real time PCR (qPCR) - Primers and primer Design - Applications of PCR	2	2	**a1,a2,b1,c1,d1**
11	Molecular biology techniques	- Introduction - Sequencing Methods and	2	4	**a1,a2,b1,c1,d1**

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
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	- **DNA Sequence Analysis**	Terminology - Sanger Sequencing - Second/Next Generation Sequencing - Pyrosequencing -			
12	Molecular biology techniques - **Advanced Techniques**	- Fluorescence in Situ Hybridization - Comparative Genome Hybridization - RNA Expression Arrays	1	2	**a1,a2,b1,c1,d1**
13	**Final Exam**		1	2	
	Number of Weeks /and Units Per Semester		**16**	**32**	

V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self-leaning
4-	**Group research**

VI. Assessment Methods of the Course:

No	Assignment	
1	**Written Exams (Short Essays) and Quizzes**	a2,a4.b1,b2,c1,c2,d3
2	Written Exams(MCQ)	a2,a4.b1,b2,c1,c2,d3
3	Structured Oral Exams	a2,a4.b1,b2,c1,c2,d3
4	Objective Structured Practical Exams (OSPE)	a2,a4.b1,b2,c1,c2,d3
5	Student presentation	a2,a4.b1,b2,c1,c2,d3

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Nabil Alowiri	Dr\ Nawal Al-Henhena	Dr\Gamil Taher Abdul Mughni.	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	Activity	Throughout the semester	20	20%	a2,a4.b1,b2,c1,c2,d3
5	Final Exam		80	80%	a2,a4.b1,b2,c1,c2,d3
Total			100		

Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

Lizabeth A. Allison – 2007 - Textbook of Fundamental molecular biology - Blackwell Publishing Ltd

2- Essential References.

1- WILLIAM B. COLEMAN and GREGORY J. TSONGALIS – 2010 - MOLECULAR DIAGNOSTICS – SECOND EDITION - SPRINGER NEW YORK DORDRECHT HEIDELBERG LONDON
2- Asklepios Bratislava – 2010 - INTRODUCTION TO MEDICAL AND MOLECULAR BIOLOGY -

3- Electronic Materials and Web Sites *etc.*

1- Harvard Molecular & Cellular Biology
2- Kimball's Biology Pages
3- Genetic Engineering and Biotechnology News

XI. *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.

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
- Dr. Nabil Alowiri	Dr\ Nawal Al-Henhena	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

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

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 Advanced Immunohematology and Blood Transfusion

Course No. (03.13. 316)

2022/2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr\Gamil Taher Abdul Mughni	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al Zabedi

I. Course Identification and General Information:					
1	**Course Title:**	Advanced Immunohematology and Blood Transfusion			
2	**Course Code & Number:**	03.13. 316			
3	**Credit Hours:**	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 1st Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Biochemistry and Molecular biology			
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:**				
13	**Date of Approval:**	2022-2023			

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr\Gamil Taher Abdul Mughni	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

II. Course Description:
Advanced Immunology is provides an in-depth understanding of the immune system. The course covers a wide range of topics, including: The structure and function of the immune system, cellular and molecular mechanisms of immunity, Antigen processing and presentation, Tissue-specific immune responses,Immune-mediated pathologies and Vaccination

III. Alignment Course Intended Learning Outcomes with program outcomes		
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 structure and function of the immune system.	**A2**
a2	Discuss the immune responses to infection, tumors, allergens, and autoimmunity	a4
B. Intellectual Skills: *Upon successful completion of the course, students will be able to:*		
b1	**Explain** the cellular and molecular basis of immunity	B1
b2	**Illustrate** the immune responses damage and potential immunotherapy for the treatment of disease	**B2**
C. Professional and Practical Skills: *Upon successful completion of the course, students will be able to:*		
c1	**Perform** different immunological diagnostic assay such as agglutination, precipitation, Enzyme-linked immunosorbent assay, Western blotting etc.	**C1**
c2	**Evaluate** the potential of immunotherapy for the treatment of disease	**C2**
D. Transferable Skills: *Upon successful completion of the course, students will be able to:*		
d1	**Communicate** effectively about immunology to a variety of audiences	**D1**

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr\Gamil Taher Abdul Mughni	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

IV. 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 structure and function of the immune system.	Lectures	Exam
	Discuss the immune responses to infection, tumors, allergens, and autoimmunity	Lectures	Exam
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Explain** the cellular and molecular basis of immunity	Lectures	Exam
B2	**Illustrate** the immune responses damage and potential immunotherapy for the treatment of disease	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	**Perform** different immunological diagnostic assay such as agglutination, precipitation, Enzyme-linked immunosorbent assay, Western blotting etc.	Lectures, pactical	Exam pactical
C2	**Evaluate** the potential of immunotherapy for the treatment of disease	Lectures, pactical	Exam pactical
(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	**Communicate** effectively about immunology to a variety of audiences	Lectures	Exam

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Dr\Gamil Taher Abdul Mughni	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
1	Introduction of Immunology	- eveiwe Historical background about the development of the discipline of immunology. -Definition immunology - Definition immunological terms. -Classification of immune system	1	2	a2,a4.b1,b2,c1,c 2,d3
2	Organs and Cells of the immune system	-Describe the organs, tissue, cells of the immune system - Cells innate immune response - Antigen presenting cells and large granular lymphocytes - Cells Adaptive immune response	1	2	a2,a4.b1,b2,c1,c 2,d3
3	Innate or Natural immunity	Definition 1-Components and functions of the natural immune defense system. -Differentiate between the main features of natural and adaptive immunity Recognize (PAR)	1	2	a2,a4.b1,b2,c1,c 2,d3
4	**Cellular defense mechanism** Phagocytosis, Cytotoxicity (NK cells) and inflammation	**-Definition** **-Type** **-Step** **-Mechanism of killing**	1	2	a2,a4.b1,b2,c1,c 2,d3
5	Antigens	**Definition** : Antigen Immunogen Adjuvant Hapten. – Types and properties of antigen,	1	2	a2,a4.b1,b2,c1,c 2,d3
6	Complement system	**-Definition** **-Properties** -Aactivation pathways:	1	2	a2,a4.b1,b2,c1,c 2,d3

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		Classical Alternative lectin pathway. -Function **-Regulation**			
7	Med term exam		1		
8	Antibodies structural	**Definition** : Immunoglobulin (Ig) **Describe** the structure and function of the Immunoglobulin -**Evaluate** the components of Ig molecule in relation to its function. -Explain the components of Ig molecule and classification into classes and subclasses of Immunoglobulins. Illustrate the components of Ig which interaction with antigens , interaction with receptors on inflammatory cells and other molecules. Immunoglobulins in disease process.	1	2	a2,a4.b1,b2,c1,c2,d3
9	Adaptive immunity:	Define Properties Cells mechanisms of humeral and cell-mediated immunity	3	2	a2,a4.b1,b2,c1,c2,d3
10	Humoral	Define Properties Cells T-dependent T- independent in the activation of B lymphocytes. Describe the transformation of activated B cells into plasma cells. recognize that plasma cells are the cells that synthesize Immunoglobulins (antibodies). describe the control mechanism of antibody mediated response.	1	2	a2,a4.b1,b2,c1,c2,d3

		know techniques of Immunoglobulins measurement			
11	cellular	Define Properties Cells understand the activation of different T lymphocyte subpopulations and subsets. Compare T Cell Receptor (TCR) and B Cell Receptor (BCR) to show similarity and dissimilarity in relation to function. To describe the mechanism of cytotoxicity by cytotoxic T lymphocyte (CTL) and other cell. To understand the control mechanism of CMI response.	2	6	a2,a4.b1,b2,c1,c 2,d3
12	Cytokine	-Definition the different terms for cytokines nomenclature. -Classification and function of different cytokines. -Mode of action and effects on immune functions. -chmokinyes function. -role of cytokines in health and disease.	1	2	a2,a4.b1,b2,c1,c 2,d3
13	Vaccines	-Difine -Type -	1	2	a2,a4.b1,b2,c1,c 2,d3
14	Final exam		1	2	
Number of Weeks /and Units Per Semester			**16**	**32**	

B - Practical Aspect: (if any)				
Order	**Tasks/ Experiments**	**Number of Weeks**	**contact hours**	**Learning Outcomes**
1	**Introduction of Antigen-Antibody Interactions and Immunodiagnostic**			a2,a4.b1,b2,c1,c2,d3
2	**Immuno-agglutination technique**			a2,a4.b1,b2,c1,c2,d3
3	**Precipitation technique**			a2,a4.b1,b2,c1,c2,d3
4	**ELISA technique**			a2,a4.b1,b2,c1,c2,d3
5	**Serodiagnosis of Hepatitis B Virus and Hepatitis C Virus.**			a2,a4.b1,b2,c1,c2,d3
Number of Weeks /and Units Per Semester				

V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self leaning
4-	**Group research**

VI. Assessment Methods of the Course:		
No	**Assignment**	
1	**Written Exams (Short Essays) and Quizzes**	a2,a4.b1,b2,c1,c2,d3
2	Written Exams(MCQ)	a2,a4.b1,b2,c1,c2,d3
3	Structured Oral Exams	a2,a4.b1,b2,c1,c2,d3
4	Objective Structured Practical Exams (OSPE)	a2,a4.b1,b2,c1,c2,d3
5	Student presentation	a2,a4.b1,b2,c1,c2,d3

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VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
1	**Midterm Exam**	7	15	15%	a2,a4.b1,b2,c1,c2,d3
2	**Activity**	Throughout the semester	5	5%	a2,a4.b1,b2,c1,c2,d3
3	Practical Report	Throughout the semester	10	10 %	a2,a4.b1,b2,c1,c2,d3
4	**Practical exam**	12	20	20%	a2,a4.b1,b2,c1,c2,d3
5	**Final Exam**	14	50	50%	a2,a4.b1,b2,c1,c2,d3
Total					

Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

1- lecture note
2- Kuby Immunology, 10th Edition,2019:Jenni Punt; Sharon Stranford; Patricia Jones; Judy Owen

2- Essential References.

1-Roitt's Essential Immunology, 13th Edition. 13thEdition, Peter J. Delves et al., Wiley-Blackwell, 2017.
2-Cellular and Molecular Immunology 10th edition, Abul K. Abbas, ELSVIEVER, 2021.

3- Electronic Materials and Web Sites *etc.*

1- https://www.youtube.com/results?search_query=Dr.+Saleh+Bahaj
2-https://onlinelearning.hms.harvard.edu/hmx/courses/immunology/
3- https://www.edx.org/learn/immunology
4- https://onlinelearning.hms.harvard.edu/hmx/courses/hmx-immunology/
-https://immunology.utoronto.ca/online-learning

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XI. *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

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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 Advanced Diagnostic Hematology

Course No. (03.13.315)

2022/2023

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:					
1	**Course Title:**	Advanced Diagnostic Hematology			
2	**Course Code & Number:**	03.13.315			
3	**Credit Hours:**	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 1st Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Medical Diagnostic Hematology			
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:**				
13	**Date of Approval:**	2022-2023			

II. Course Description:

This course provides an in-depth look at the diagnosis of hematologic disorders. Topics covered include the interpretation of blood cell counts, peripheral blood smears, bone marrow biopsies, and other diagnostic tests. Students will also learn about the role of molecular diagnostics in the diagnosis of hematologic disorders

III. Alignment Course Intended Learning Outcomes with program outcomes

	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 pathophysiology of hematologic disorders	**a1**
B. Intellectual Skills: **Upon successful completion of the course, students will be able to:**		
b1	**Interpret and Explain** result of blood cell counts, peripheral blood smears, bone marrow biopsies	**b1**
C. Professional and Practical Skills: **Upon successful completion of the course, students will be able to:**		
c1	**Interpret**, verify and validate results and report findings to the requesting clinician.	**c1**
D. Transferable Skills: **Upon successful completion of the course, students will be able to:**		
d1	**Communicated** effectively through oral presentational, computer procession and presentation and written report	**d1**

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
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IV. 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 pathophysiology of hematologic disorders	Lecture	Exam
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Interpret and Explain** result of blood cell counts, peripheral blood smears, bone marrow biopsies	Lecture	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	**Interpret**, verify and validate results and report findings to the requesting clinician.	Lecture Discussion Presentation	Exam Discussion Presentation
(D Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	**Communicated** effectively through oral presentational, computer procession and presentation and written report	Lecture Discussion Presentation	Exam Discussion Presentation

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
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Course Content:					
A – Theoretical Aspect:					
Order	**Units/Topics List**	**Sub Topics List**	Number of Weeks	**contact hours**	**Learning Outcomes**
1	Complete blood count (CBC)		2	4	a1,b1,c1,d1
2	Red blood cell indices		3	6	a1,b1,c1,d1
3	White blood cell differential		1	2	a1,b1,c1,d1
4	Platelet count		3	6	a1,b1,c1,d1
5	Peripheral blood smears		2	4	a1,b1,c1,d1
	Bone marrow biopsies		2	4	a1,b1,c1,d1
7	Coagulation studies		1	2	a1,b1,c1,d1
8	Other diagnostic tests for hematologic disorders	Flow cytometer Immunohistochemistry Molecular diagnostics	1	2	a1,b1,c1,d1
9	Peripheral blood smear Bone marrow biopsy	interpretation Differential diagnosis	1	2	a1,b1,c1,d1
Number of Weeks /and Units Per Semester			16	**32**	

V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self leaning
4-	**Group discussion**
	Case study analysis

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
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VI. Assessment Methods of the Course:	
No	**Assignment**
1	**Written Exams (Essays) and Quizzes**
2	Structured Oral Exams
4	Objective Structured Practical Exams (OSPE)
5	Student presentation
6	Case study analysis

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	**Activity**	Throughout the semester	10	10%	a1,b1,c1,d1
3	Practical Report	Throughout the semester	10	10 %	a1,b1,c1,d1
4	**Practical exam**	12	20	20%	a1,b1,c1,d1
5	**Final Exam**	14	60	60%	a1,b1,c1,d1
Total					

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
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X. Learning Resources:	
· *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*	
1- Required Textbook(s) (maximum two).	
1-	Basic Principles and Practice , 2017 by Ronald Hoffman et al.
2-	Williams Hematology ,2010 ,by Kenneth Kaushansky et al.
2- Essential References.	
1-	Clinical Hematology, Theory and Procedures by Mary Louise Turgeon 2018 .
2-	Hematology: Principles and Practice, 9th Edition by Kenneth Kaushansky, Michael Greaves, and Richard Aster
3- Electronic Materials and Web Sites *etc*.	
1-	The American Society of Hematology website www.hematology.org
2-	The National Institutes of Health, National Heart, Lung, and Blood Institute Website www.nhlbi.nih.gov
3-	The World Health Organization website (www.who.int)
4-	The Centers for Disease Control and Prevention website (www.cdc.gov)
	Medscape Hematology (www.medscape.com/hematology)
	Blood Journal (www.bloodjournal.org)

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XI. *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

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
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Republic of Yemen

Ministry of Higher Education & Scientific Research

21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIEED

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Faculty of Laboratory medicine..

Department of Hematology

Course Specification of Advanced Hematology IV (Hematological Malignancies)

Course No. (03.13.314)

2022/2023

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Omer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:

1	**Course Title:**	Advanced Hematology IV (Hematological Malignancies)			
2	**Course Code & Number:**	03.13.314			
3	**Credit Hours:**	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 2nd Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Medical Diagnostic Hematology			
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:**				
13	**Date of Approval:**	2022-2023			

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

II. Course Description:

This course provides an in-depth look at the diagnosis and management of advanced hematologic malignancies. Topics covered include the pathophysiology, clinical presentation, diagnosis, and treatment of acute leukemia, chronic leukemia, lymphoma, myeloma, and other hematologic malignancies. Students will also learn about the role of supportive care in the management of hematologic malignancies.

III. Alignment Course Intended Learning Outcomes with program outcomes

	III. Course Intended Learning Outcomes (CILOs)	Referenced PILOs
A. Knowledge and Understanding: *Upon successful completion of the course, students will be able to:*		
a1	Understand the classification, causes, pathophysiology, clinical features, laboratory diagnosis and treatment of hematologic malignancie	**A1**
B. Intellectual Skills: *Upon successful completion of the course, students will be able to:*		
b1	Interpret the clinical and laboratory information to understand and classify different types of hematologic malignancie	**A1**
C. Professional and Practical Skills: *Upon successful completion of the course, students will be able to:*		
c1	Evaluate the latest research in the hematologic malignancie	**C1**
D. Transferable Skills: *Upon successful completion of the course, students will be able to:*		
d1	Communicate effectively about the diagnosis and management of hemostasis and thrombosis with patients, families, and other healthcare professionals	**D1**

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
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IV. 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	Understand the classification, causes, pathophysiology, clinical features, laboratory diagnosis and teatment of hematologic malignancie	Lecture	Exam

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	Interpret the clinical and laboratory information to understand and classify different types of hematologic malignancie	Lecture	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	Evaluate the latest research in the hematologic malignancie	Lecture Discussion Presentation	Exam Discussion Presentation

(D Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	Communicate effectively about the diagnosis and management of hemostasis and thrombosis with patients, families, and other healthcare professionals	Lecture Discussion Presentation	Exam Discussion Presentation

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
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Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
1	Overview of Hematological Malignancies:.	An introduction to the different types of hematological malignancies, including acute and chronic leukemias, lymphomas, and multiple myeloma	2	4	a1,b1,c1,d1
2	Pathophysiology of Hematological Malignancies:	A detailed examination of the genetic and molecular mechanisms underlying the development and progression of hematological malignancies.	3	6	a1,b1,c1,d1
3	Diagnosis of Hematological Malignancies:	A review of the clinical presentation, diagnostic evaluation, and staging of hematological malignancies, including bone marrow biopsy, flow cytometry, cytogenetics, and imaging studies.	1	2	a1,b1,c1,d1
4	Treatment of Acute Leukemias:	An examination of the current treatment approaches for acute myeloid leukemia and acute lymphoblastic leukemia, including chemotherapy, stem cell transplantation, and targeted therapies.	3	6	a1,b1,c1,d1
5	Treatment of Chronic Leukemias:	A discussion of the treatment options for chronic myeloid leukemia and chronic lymphocytic leukemia, including tyrosine kinase inhibitors, monoclonal antibodies, and stem cell transplantation.	2	4	a1,b1,c1,d1
6	Treatment of Lymphomas:	An overview of the treatment strategies for Hodgkin lymphoma and non-Hodgkin lymphoma, including chemotherapy, radiation therapy, immunotherapy, and stem cell transplantation.	2	4 4	a1,a2,b1,c3,d1

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
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		A discussion of the treatment		4	a1,b1,c1,d1
7	Treatment of Multiple Myeloma:	options for multiple myeloma, including chemotherapy, immunomodulatory drugs, proteasome inhibitors, and stem cell transplantation.	2		
8	Supportive Care:	An examination of the supportive care measures used to manage the complications of hematological malignancies and their treatment, including infection prophylaxis, transfusion support, and symptom management.	2	4	a1,b1,c1,d1
9	Emerging Therapies:	A review of the emerging treatment approaches for hematological malignancies, including immunotherapy, targeted therapies, and gene therapy.	2	4	a1,b1,c1,d1
10	Case Studies:	Application of the principles learned in the course to real-life cases, including diagnosis and treatment plans.	2	4	a1,b1,c1,d1
7	Final exam		1	2	a1,b1,c1,d1
Number of Weeks /and Units Per Semester			16	**32**	

- Acute leukemia

V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self leaning
4-	**Group discussion**
	Case study analysis

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

VI. Assessment Methods of the Course:	
No	**Assignment**
1	**Written Exams (Essays) and Quizzes**
2	Structured Oral Exams
4	Objective Structured Practical Exams (OSPE)
5	Student presentation
6	Case study analysis

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	**Activity**	Throughout the semester	10	10%	a1,b1,c1,d1
3	Practical Report	Throughout the semester	10	10 %	a1,b1,c1,d1
4	**Practical exam**	12	20	20%	a1,b1,c1,d1
5	**Final Exam**	14	60	60%	a1,b1,c1,d1
Total					

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

X. Learning Resources:	
Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).	
1- Required Textbook(s) (maximum two).	
1-	Basic Principles and Practice , 2017 by Ronald Hoffman et al.
2-	Williams Hematology ,2010 ,by Kenneth Kaushansky et al.
2- Essential References.	
1-	Clinical Hematology, Theory and Procedures by Mary Louise Turgeon 2018 .
2-	Clinical Principles and Applications by Bernadette F. Rodak and George A. Fritsma.
3- Electronic Materials and Web Sites *etc*.	
1-	The American Society of Hematology website www.hematology.org
2-	The National Institutes of Health, National Heart, Lung, and Blood Institute Website www.nhlbi.nih.gov
3-	The World Health Organization website (www.who.int)
4-	The Centers for Disease Control and Prevention website (www.cdc.gov)
5	Medscape Hematology (www.medscape.com/hematology)
6	Blood Journal (www.bloodjournal.org)

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

XI. *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

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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 **Advanced Hematology III (Hemostasis and Thrombosis)**

Course No. (03.13.313)

2022/2023

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:					
1	**Course Title:**	Advanced Hematology III (Hemostasis and Thrombosis)			
2	**Course Code & Number:**	(03.13.313)			
3	**Credit Hours:**	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 1st Semester			
5	**Pre –Requisite (if any):**	Advanced Hematology I, II			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Medical Diagnostic Hematology			
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:**				
13	**Date of Approval:**	2022-2023			

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

II. Course Description:

This course provides an in-depth look at the pathophysiology, diagnosis, and management of hemostasis and thrombosis. Topics covered include the coagulation cascade, platelet function, fibrinolysis, and the role of genetics and acquired factors in hemostasis disorders. Students will also learn about the prevention and treatment of venous thromboembolism (VTE), arterial thromboembolism (ATE), and disseminated intravascular coagulation (DIC).

III. Alignment Course Intended Learning Outcomes with program outcomes

	III. Course Intended Learning Outcomes (CILOs)	Referenced PILOs
A. Knowledge and Understanding: **Upon successful completion of the course, students will be able to:**		
a1	Understand the different types, causes, pathophysiology, signs, symptoms, laboratory diagnosis and treatment of coagulation disorders	A1
B. Intellectual Skills: **Upon successful completion of the course, students will be able to:**		
b1	Interpret the clinical and laboratory information to understand and classify different types coagulation disorders	B1
C. Professional and Practical Skills: **Upon successful completion of the course, students will be able to:**		
c1	Evaluate the latest research in the field of coagulation disorders disorders	C1
D. Transferable Skills: **Upon successful completion of the course, students will be able to:**		
d1	Communicate effectively about the diagnosis and management of hemostasis and thrombosis with patients, families, and other healthcare professionals	D1

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zubedi

IV. 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	**Understand** the different types, causes, pathophysiology, signs, symptoms, laboratory diagnosis and teatment of coagulation disorders	Lecture	Exam
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Interpret** the clinical and laboratory information to understand and classify different types coagulation disorders.	Lecture	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	**Evaluate** the latest research in the field of coagulation disorders disorders	Lecture Discussion Presentation	Exam Discussion Presentation
(D Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	**Communicate** effectively about the diagnosis and management of hemostasis and thrombosis with patients, families, and other healthcare professionals	Lecture Discussion Presentation	Exam Discussion Presentation

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
1	Overview of Hemostasis:	A review of the normal physiological processes involved in hemostasis, including platelet activation, coagulation cascade, fibrinolysis, and endothelial function.	2	4	a1,b1,c1,d1
2	Coagulation cascade, fibrinolysis, and endothelial function.	coagulation cascade, fibrinolysis, and endothelial function.	2	4	
3	Bleeding Disorders:	A detailed examination of the pathophysiology, clinical presentation, and diagnostic evaluation of bleeding disorders, including von Willebrand disease, hemophilia, and platelet function disorders.	2	4	a1,b1,c1,d1
4	Thrombotic Disorders:	A detailed examination of the pathophysiology, clinical presentation, and diagnostic evaluation of thrombotic disorders, including deep vein thrombosis, pulmonary embolism, arterial thrombosis, and thrombotic microangiopathies.	2	4	a1,b1,c1,d1
5	Anticoagulant Therapy	A discussion of the pharmacology, indications, and monitoring of anticoagulant medications, including heparin, warfarin, direct oral anticoagulants, and antiplatelet agents.	1	2	a1,b1,c1,d1
6		An overview of the pharmacology and indications for thrombolytic agents in the treatment of acute thrombotic events.	1	2	a1,b1,c1,d1
7	Laboratory Evaluation of Hemostasis and	An introduction to the laboratory techniques used to evaluate	2	4	a1,b1,c1,d1

	Thrombosis:	hemostasis and thrombosis,			
		including bleeding time, clotting time, platelet function testing, coagulation factor assays, and genetic testing.			
8	Thrombophilia:	A discussion of the genetic and acquired risk factors for thrombosis, including factor V Leiden, prothrombin gene mutation, and antiphospholipid syndrome.	1	2	a1,b1,c1,d1
9	Hemostasis and Thrombosis in Special Populations:	A review of the unique considerations for hemostasis and thrombosis in pregnancy, pediatrics, and elderly populations.	1	2	a1,b1,c1,d1
10	Thrombosis Prevention Strategies:	A discussion of the strategies for preventing thrombotic events, including prophylaxis in surgical and medical settings, and lifestyle modifications.	1	2	a1,b1,c1,d1
11	Final exam		1	2	a1,b1,c1,d1
Number of Weeks /and Units Per Semester			16	**32**	

V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self leaning
4-	Group discussion
	Case study analysis

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

VI. Assessment Methods of the Course:	
No	**Assignment**
1	Written Exams (Essays) and Quizzes
2	Structured Oral Exams
4	Objective Structured Practical Exams (OSPE)
5	Student presentation
6	Case study analysis

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	Activity	Throughout the semester	10	10%	a1,b1,c1,d1
3	Practical Report	Throughout the semester	10	10 %	a1,b1,c1,d1
4	Practical exam	12	20	20%	a1,b1,c1,d1
5	Final Exam	14	60	60%	a1,b1,c1,d1
Total					

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

X. Learning Resources:	
· Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).	
1- Required Textbook(s) (maximum two).	
1-	Basic Principles and Practice , 2017 by Ronald Hoffman et al.
2-	Williams Hematology ,2010 ,by Kenneth Kaushansky et al.
2- Essential References.	
1-	Clinical Hematology, Theory and Procedures by Mary Louise Turgeon 2018 .
2-	Clinical Principles and Applications by Bernadette F. Rodak and George A. Fritsma.
3- Electronic Materials and Web Sites *etc*.	
1-	The American Society of Hematology website www.hematology.org
2-	The National Institutes of Health, National Heart, Lung, and Blood Institute Website www.nhlbi.nih.gov
3-	The World Health Organization website (www.who.int)
4-	The Centers for Disease Control and Prevention website (www.cdc.gov)
5	Medscape Hematology (www.medscape.com/hematology)
6	Blood Journal (www.bloodjournal.org)

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
. Dr Fuad Balkam	- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

XI. *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

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
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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 Advanced Hematology II (Red Blood Cell Disorders)

Course No. (03.13.312)

2022/2023

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Abdulrahman Amer	. Dr Fuad Balkam	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:					
1	**Course Title:**	Advanced Hematology II (Red Blood Cell Disorders)			
2	**Course Code & Number:**	03.13.312			
3	**Credit Hours:**	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 1st Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Medical Diagnostic Hematology			
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:**				
13	**Date of Approval:**	2022-2023			

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Abdulrahman Amer	. Dr Fuad Balkam	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

II. Course Description:
This course provides an in-depth look at the pathophysiology, diagnosis, and management of advanced red blood cell disorders. Topics covered include:Anemias, Sickle cell disease, Thalassemia, Hemoglobinopathies and Acquired red blood cell disorders

III. Alignment Course Intended Learning Outcomes with program outcomes		
	III. Course Intended Learning Outcomes (CILOs)	Referenced PILOs
A. Knowledge and Understanding: **Upon successful completion of the course, students will be able to:**		
a1	Understand the different types, causes, pathophysiology, clinical features, laboratory diagnosis and treatment of anemia.	A1
B. Intellectual Skills: **Upon successful completion of the course, students will be able to:**		
b1	Interpret the clinical and laboratory information to understand and classify different types of anemia.	B1
C. Professional and Practical Skills: **Upon successful completion of the course, students will be able to:**		
c1	Evaluate the latest research in the field of red blood cell disorders	C1
D. Transferable Skills: **Upon successful completion of the course, students will be able to:**		
d1		D1

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Abdulrahman Amer	. Dr Fuad Balkam	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

IV. 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	**Understand** the different types, causes, pathophysiology, clinical features, laboratory diagnosis and teatment of anemia. of anaemia	Lecture	Exam
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	**Interpret** the clinical and laboratory information to understand and classify different types of anemia.	Lecture	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	**Evaluate** the latest research in the field of red blood cell disorders	Lecture Discussion Presentation	Exam Discussion Presentation
(D Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1		Lecture Discussion Presentation	Exam Discussion Presentation

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Abdulrahman Ameri	. Dr Fuad Balkam	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	contact hours	Learning Outcomes
1	1. Introduction to Red Blood Cell Disorders:.	An overview of the different types of red blood cell disorders, including anemias, hemoglobinopathies, and red blood cell membrane disorders	1	2	a1,b1,c1
2	2. Red Blood Cell Production and Destruction:	The process of red blood cell production and breakdown, including the role of erythropoietin, the bone marrow, and the spleen.	1	2	a1,b1,c1
3	3. Anemia:	A detailed look at the causes, symptoms, and treatment of anemia, including iron deficiency anemia, hemolytic anemia, and aplastic anemia.	2	4	a1,b1,c1
4	Hemoglobinopathies	A discussion of the genetic mutations that can cause abnormal hemoglobin production, including sickle cell anemia and thalassemia.	2	4	a1,b1,c1
5	Red Blood Cell Membrane Disorders	An examination of the genetic mutations that can affect the structure and function of red blood cell membranes, including hereditary spherocytosis and	2	4	a1,b1,c1

		elliptocytosis.			
6	Red Blood Cell Enzyme Deficiencies:	A look at the genetic mutations that can affect the enzymes involved in red blood cell metabolism, including glucose-6-phosphate dehydrogenase deficiency.	1	2	a1,b1,c1
7	7. Red Blood Cell Transfusion:	An overview of the indications for red blood cell transfusion, the types of blood products available, and the risks and benefits of transfusion.	1	2	a1,b1,c1
8	8. Hemolytic Disease of the Newborn:	A discussion of the causes, prevention, and treatment of hemolytic disease of the newborn, including Rh incompatibility and ABO incompatibility.	1	2	a1,b1,c1
9	9. Other Red Blood Cell Disorders:	A brief overview of less common red blood cell disorders, including paroxysmal nocturnal hemoglobinuria and cold agglutinin disease.	1	2	a1,b1,c1
10	Case Studies:	Application of the principles learned in the course to real-life cases, including diagnosis and treatment plans.	2	4	a1,b1,c1
12	Final exam		1	2	a1,b1,c1
Number of Weeks /and Units Per Semester			16	**32**	

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Abdulrahman Amer	. Dr Fuad Balkam	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self leaning
4-	**Group discussion**
	Case study analysis

VI. Assessment Methods of the Course:	
No	**Assignment**
1	**Written Exams (Essays) and Quizzes**
2	Structured Oral Exams
4	Objective Structured Practical Exams (OSPE)
5	Student presentation
6	Case study analysis

VII. Assignments:

No.	Assignments	Week Due	Mark	Proportion of Final Assessment	Aligned CILOs (symbols)
2	Activity	Throughout the semester	10	10%	a1,b1,c1
3	Practical Report	Throughout the semester	10	10 %	a1,b1,c1
4	Practical exam	12	20	20%	a1,b1,c1
5	Final Exam	14	60	60%	a1,b1,c1
Total					

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Abdulrahman Amer	. Dr Fuad Balkam	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

X. Learning Resources:	
· Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).	
1- Required Textbook(s) (maximum two).	
1-	Basic Principles and Practice , 2017 by Ronald Hoffman et al.
2-	Williams Hematology ,2010 ,by Kenneth Kaushansky et al.
2- Essential References.	
1-	Clinical Hematology, Theory and Procedures by Mary Louise Turgeon 2018 .
2-	Clinical Principles and Applications by Bernadette F. Rodak and George A. Fritsma.
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1-	The American Society of Hematology website www.hematology.org
2-	The National Institutes of Health, National Heart, Lung, and Blood Institute Website www.nhlbi.nih.gov
3-	The World Health Organization website (www.who.int)
4-	The Centers for Disease Control and Prevention website (www.cdc.gov)
5	Medscape Hematology (www.medscape.com/hematology)
6	Blood Journal (www.bloodjournal.org)

XI. *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

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Abdulrahman Amer	. Dr Fuad Balkam	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

	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

Republic of Yemen

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21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIEED

SCIENCES

Faculty of Laboratory medicine..

Department of Hematology

Course Specification of **Advanced Hematology I Stem Cells and Hemopoiesis**

Course No. (03.13.311)

2022/2023

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

I. Course Identification and General Information:					
1	**Course Title:**	Advanced Hematology I Stem Cells and Hemopoiesis			
2	**Course Code & Number:**	03,13,311			
3	**Credit Hours:**	Theory Hours			
		Lecture	Exercise	Practical	Credit Hours
		2	0	2	3
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 1st Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Medical Diagnostic Hematology			
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:**				
13	**Date of Approval:**	2022-2023			

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

II. Course Description:

This course will provide an in-depth look at the biology of stem cells and hematopoiesis. Topics will include the biology of stem cells, the differentiation of stem cells into blood cells, the regulation of hematopoiesis, and the role of stem cells in disease.

III. Alignment Course Intended Learning Outcomes with program outcomes

III. Course Intended Learning Outcomes (CILOs)		Referenced PILOs
A. Knowledge and Understanding: **Upon successful completion of the course, students will be able to:**		
a1	Understand the basic biology of stem cells	A1
B. Intellectual Skills: **Upon successful completion of the course, students will be able to:**		
b1	Explain the regulation of hematopoiesis	B1
C. Professional and Practical Skills: **Upon successful completion of the course, students will be able to:**		
c1	• Evaluate the ethical issues surrounding stem cell research	C1
c2		
D. Transferable Skills: **Upon successful completion of the course, students will be able to:**		
d1		D1

Prepared by:	Reviewed by:	Heamatolgy Department Charge D'affairs	Vice Dean for Quality affairs	Dean of College:
- Dr. Abdulrahman Amer	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

- Explain the role of stem cells in diseases such as leukemia and lymphoma
- Apply the principles of stem cell research to their own research or clinical practice

IV. 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	Understand the basic biology of stem cells	Lecture	Exam
(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	Explain the regulation of hematopoiesis	Lecture	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	• Evaluate the ethical issues surrounding stem cell research	Lecture Discussion Presentation	Exam Discussion Presentation
(D Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:			
	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	Communicate effectively about stem cells	Lecture Discussion Presentation	Exam Discussion Presentation

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Course Content:					
A – Theoretical Aspect:					
Order	**Units/Topics List**	**Sub Topics List**	**Number of Weeks**	**contact hours**	**Learning Outcomes**
1	Introduction to Stem Cells	What are stem cells? Types of stem cells The properties of stem cells	2	4	a1,b1,c1,d1
2	Hematopoiesis	The development of blood cells Hematopoiesis The different types of blood cells The development of blood cells from stem cells	2	4	a1,b1,c1,d1
3	Regulation of Hematopoiesis	The regulation of hematopoiesis The factors that regulate hematopoiesis The role of cytokines in hematopoiesis	2	4	a1,b1,c1,d1
4	Stem Cells in Disease	Diseases of stem cells and hematopoiesis Aplastic anemia Leukemia Myelodysplastic syndromes	2	4	a1,b1,c1,d1
5	Midterm Exam		1	2	a1,b1,c1,d1
6	Laboratory Exercise:	Isolation and Culture of Hematopoietic Stem Cells	1	2	a1,b1,c1,d1
7	Student Presentations		1	2	a1,b1,c1,d1
8	Graft-Versus-Host Disease (GVHD)		1	2	a1,b1,c1,d1
9	Gene Therapy and Stem Cells		2	4	a1,b1,c1,d1
10	Clinical Applications of HSCs in Hematology		1	2	a1,b1,c1,d1
11	Ethical and Regulatory Issues in Stem Cell Research and Clinical Applications		1	2	a1,b1,c1,d1
12	Final Exam				a1,b1,c1,d1

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Number of Weeks /and Units Per Semester	12	**32**	

B - Practical Aspect: (if any)				
Order	**Tasks/ Experiments**	**Number of Weeks**	**contact hours**	**Learning Outcomes**
1	Introduction to diagnostic techniques of tumors	3	6	a1,a2,b1,c3,d1
2	Diagnostic test for heart and liver diseases	3	6	a1,a2,b1,c3,d1
3	ELISA techniques	2	4	a1,a2,b1,c3,d1
Number of Weeks /and Units Per Semester				

V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self leaning
4-	Group discussion
	Case study analysis

VI. Assessment Methods of the Course:	
No	**Assignment**
1	Written Exams (Essays) and Quizzes
2	Structured Oral Exams
4	Objective Structured Practical Exams (OSPE)
5	Student presentation
6	Case study analysis

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VII. Assignments:					
No.	**Assignments**	**Week Due**	**Mark**	**Proportion of Final Assessment**	**Aligned CILOs (symbols)**
1	Activity	Throughout the semester	10	10%	a1,a2,b1,c3,d1
2	Practical Report	Throughout the semester	10	10 %	a1,a2,b1,c3,d1
3	Practical exam	12	20	20%	a1,a2,b1,c3,d1
5	Final Exam	14	60	60%	a1,a2,b1,c3,d1
Total					

Learning Resources:

- Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

- 1-Hematopoiesis: A Cellular and Molecular Approach by John E. Dick
- 2-Stem Cell Biology by Alexander R.P. de Sousa

2- Essential References.

Stem Cells and Regenerative Medicine by Anthony Atala and James J. Yoo

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XI. 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.
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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

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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 **Medical laboratory training**

Course No. ()

2022 /2023

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr. Ebtesam Al-Zabedi	Dr. Nawal Al-Henhena	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	- Associate Prof. Dr. Ebtesam Al-Zabedi

Practical WBCs disorder

I. Course Identification and General Information:

1	**Course Title:**	Medical laboratort training.rtf			
2	**Course Code & Number:**				
3	**Credit Hours:**	**Theory Hours**			
		Lecture	**Exercise**	Practical	**Credit Hours**
		0	0	4	1
4	**Study Level/ Semester at which this Course is offered:**	1st Level / 2nd Semester			
5	**Pre –Requisite (if any):**	None			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Master Degree Medical laboratory training			
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. Gamil taher			
13	**Date of Approval:**	2023			

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
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NO.	Tasks/ Experiments	Sub title	Number of Weeks	Contact hours
1	Introduction to laboratory diagnosis for WBCs disorder	Classification of WBCs disorder and its Indication from CBCs and blood film	1	2
2	Normal leucopoiesis stages	microscopic pictures	1	2
3	Peripheral blood smear morphology for benign change		1	2
4	Peripheral blood smear morphology for malignant myeloid change		1	2
5	Peripheral blood smear morphology for malignant lymphoid change		1	2
6	Reactive lymphocyte change with lymphoma change on peripheral blood smear		1	2
7	cytochemical stains		1	2
8	Bone marrow smear technique and fixation		1	2
9	Bone marrow examination	Smear, fixation, microscopic analysis and report form	1	2
10	Immunophenotyping classification and examination		1	2

Practical RBCs disorder

NO.	Tasks/ Experiments	Sub title	Number of Weeks	Contact hours
1	Introduction to Laboratory diagnosis for RBCs disorder		1	2
2	Manual CBC and peripheral blood film fixation and staining		1	2
3	Hematology stain	Type of Stain, composition, preparation and used	1	2
4	CBC Automation	CBC automation principle, artificial result error from CBC	1	2
11	Flowcytometry		1	2
12	Gene expression/mutation analysis		1	2
13	Chromosome study and cytogenetic analysis		1	2
Number of Weeks /and Units Per Semester				

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		and it's correction technique and blood film indications		
5	Normal erythropoiesis stages	microscopic pictures and WBCs correction	1	2
6	Blood film report	Anisocytosis, poikilocytosis, abnormal RBC Shape and inclusion	3	6
7	Retic count		1	2
8	Special Chemical test in hematology	Iron, TIPC, transferrin, ferritin, G6PD, vit B12, folate .. etc.	2	2
9	Special hematology test	Osmotic fragility, sickling, solubility, ham test .. ect.	2	2
10	Electrophoresis		1	2
11	Bone marrow examination and report		1	2
12	Quality Assurance in general hematology	Safety practice Pre analytic, analytic, and post analytic error source Reliability check for CBC and	1	2

		other hematology result		
Number of Weeks /and Units Per Semester				

Practical blood bank				
NO.	**Tasks/ Experiments**	**Sub title**	**Number of Weeks**	**Contact hours**
1	Introduction to blood bank practical	Reagent, equipment and different principle of serology reaction	1	2
2	RBCs washing and cell suspension preparation		1	2
3	Blood grouping	Slide and tube (foreword and reverse)	1	2
4	Blood sub group	Detection and reagent used	1	2
5	Weak D positive techniques		1	2
6	ABO blood group Discrepancy	Detection and problem solving	1	2
7	Comb's test	DAT, IAT	1	2
8	Ab titration		1	2
9	Ab screening and identification		2	4
١٠	Ab elusion techniques		1	2
١١	Pre transfusion tests and Crossmatching		1	2
١٢	Blood component preparation and preservation	Component and PRP preparation	1	2
١٣	Advance technique in blood bank	Apheresis, automation .. etc.	1	2
١٤	Quality Assurance and infection prevention control in blood bank		1	2
Number of Weeks /and Units Per Semester				

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Practical hemostasis/coagulation				
NO.	**Tasks/ Experiments**	**Sub title**	**Number of Weeks**	**Contact**

				hours
1	Introduction to laboratory homeostasis/coagulation study tests		1	2
2	Screening test Primary homeostasis	A. Plt count: 1- Manually 2- automation with plt indices and it's indication 3- semi-quantity by peripheral smear B. Plt function screen test for: 1. bleeding time 2. screen for plt aggregation	1	2
3	Bone marrow analysis for plt and megakaryocyte disorder		1	2
4	Plt function test	1. Tests for General functions (adhesion, activation, and aggregation) 2. Test for specific abnormality	2	4
5	Secondary homeostasis screening test	Clotting time, PT, aPTT, TT, Reptile's test .. etc.	1	2
6	Mixing study		1	2
7	Factor assay		1	2
8	Von Willebrand disease classification and diagnostic tests		1	2
10	Advance techniques for homeostasis study	Flowcytometry (immunophenotyping) and genetic related test	1	2
١١	Quality assurance in homeostasis/coagulation lab		1	2
Number of Weeks /and Units Per Semester				

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V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session
3-	Self-leaning
4-	**Group research**

VI. Assessment Methods of the Course:

No	Assignment	
1	**Written Exams (Short Essays) and Quizzes**	
2	Written Exams(MCQ)	
3	Structured Oral Exams	
4	Objective Structured Practical Exams (OSPE)	
5	Student presentation	

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