

Republic of Yemen
Ministry of Higher Education & Scientific Research
21 September University for Medicals and Applied Sciences



Faculty of Clinical Pharmacy

Bachelor of Clinical Pharmacy & Pharm. D.

Course Specification of
Pharmaceutical Calculation

Course Code. (02.02.228)

2022



T4: This Template is Developed and Approved by CAQA-Yemen, 2024

Prepared by:
Dr. Mohammed Addoais

Reviewed by:

Head of the Department:
Dr. -----

Vice Dean for Quality affairs
Dr. Abdulelah Thabet

Dean of College:
Dr. Ali Alyahawi

I. General Information:

1.	Course Title:	Pharmaceutical Calculation			
2.	Course Code:	02.02.228			
3.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours
			Lecture	Tutorial/Seminar	Lab Clinical
		1	1		--
4.	Level/ Semester at which this Course is offered:	2 nd Level/ 1 st Semester			
5.	Pre –Requisite (if any):	- General chemistry			
6.	Co –Requisite (if any):	-			
7.	Program (s) in which the Course is Offered:	Bachelor of Clinical Pharmacy & Pharm. D.			
8.	Language of Teaching the Course:	English			
9.	Location of Teaching the Course:	Faculty of Clinical Pharmacy			
10.	Prepared by:	Mohammed Addoais			
11.	Date and Number of Approval by Council:	2022			

II. Course Description:

This course is designed to introduce the quantitative and basic principles of pharmaceutical calculations to pharmacy practice and pharmaceutical science. Topics covered include ratio and proportion, dilution, allegation, decimals, percent, and concentration, milliequivalent, units, and intravenous flow rates. It also aims at providing pharmacy students with the knowledge and skills needed to carry out interpretation and calculations of different units used in prescriptions.



II. Course Intended Learning Outcomes (CILOs) : Upon successful completion of the course, students will be able to:		Referenced PILOs	
A. Knowledge and Understanding:		I, P or M/A	
a1	List different measurement systems used in pharmacy.		A1
a2	Carry out conversions between units of different systems.		A1
B. Intellectual Skills:			
b1	Explain dilution and concentration of pharmaceutical preparations.		B1
b2	Use formula to calculate amounts of substances needed to compound pharmaceuticals.		B1
C. Professional and Practical Skills:			
c1	Prepare the student to carry out all interpretations and conversions found in prescriptions		C1
c2	Illustrate the basic skills to calculate dosage and concentration in different pharmaceutical dosage forms		C2
D. Transferable Skills:			
d1	Illustrate the ability to read and interpret prescriptions.		D1
d2	Able to communicate with the physicians and patients.		D1
I= Introduced, P=Practiced or M/A= Mastered/Advanced			

(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:		
Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
a1	- Lecture - Instructor – student Interactive - Office hour	- Exam - Assignment - Quiz
a2	- Lecture - Instructor – student Interactive - Office hour	- Exam - Assignment - Quiz
(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:		
Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies

b1	Explain dilution and concentration of pharmaceutical preparations.	- Lecture - Instructor – student Interactive - Exercises - Solving Problem Methods	- Problem-Solving Exercises. - Assignment - Quiz
b2	Use formula to calculate amounts of substances needed to compound pharmaceuticals.	- Lecture - Instructor – student Interactive - Exercises - Solving Problem Methods	- Problem-Solving Exercises. - Assignment - Quiz
(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:			
Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
c1	Prepare the student to carry out all interpretations and conversions found in prescriptions	- Lecture - Instructor – student Interactive - Self-Learning	- Exam - Assignment - Quiz
c2	Illustrate the basic skills to calculate dosage and concentration in different pharmaceutical dosage forms	- Lecture - Instructor – student Interactive - Self-Learning	- Exam - Assignment - Quiz
(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:			
Course Intended Learning Outcomes		Teaching Strategies	Assessment Strategies
d1	Illustrate the ability to read and interpret prescriptions.	- Self-Learning - Seminar - Exercises	- Presentation - Assignment - Quiz
d2	Able to communicate with the physicians and patients.	- Seminar - Instructor–student Interactive - Exercises	Presentation

IV. Course Contents:

A. Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact Hours
1	Introduction to pharmaceutical calculation	a1, a2, b1, b2, c1, c2, d1, d2	- Arabic numbers - Roman numbers - Percentage - Ratio Strength - Other Expressions of Concentration, - Percentage Weight in Volume	2	4

			- Volume in Volume - Weight in Weight.		
2	Prescription	a1, a2, b1, b2, c1, c2, d1, d2	- Interpretation of the prescription or medication order. - Range of prescription and medication order calculations. - Prescription and medication order accuracy. - Use abbreviations and symbols	2	4
3	Units of measurement	a1, a2, b1, b2, c1, c2, d1, d2	- The Metric System. - Measurement of Length, Volume, and Weight. - Relation of Metric to other systems of Measurement. - Temperature conversion	2	4
4	Posology	a1, a2, b1, b2, c1, c2, d1, d2	- General considerations - Dose definitions. - Routes of drug/dose administration and dosage forms. - Dose measurement general dose calculations. - Calculation of doses according to patient parameters, pediatric patient, geriatric patient. - Drug dosage based on age, drug dosage based on weight or body surface area.	2	4
5	Density and specific gravity	a1, a2, b1, b2, c1, c2, d1, d2	- Density, Specific Gravity and specific volume. - Use of Specific Gravity in Calculation of Weight and Volume.	1	2
6	Mid-term Exam			1	2
7	Electrolyte solutions	a1, a2, b1, b2, c1, c2, d1, d2	- Milliequivalents - Millimoles - Osmolarity - Milliosmoles	1	2
8	Isotonic and buffer solution calculations	a1, a2, b1, b2, c1, c2, d1, d2	- Isotonic and Buffer Solutions. - Special Clinical Considerations of Tonicity. - Physical/Chemical considerations in the preparation of isotonic Solutions.	1	2

			Buffers and Buffer Solutions.		
9	Dilution, Concentration and Alligation	a1, a2, b1, b2, c1, c2, d1, d2	- Special considerations of dilution and concentration in pharmaceutical compounding. - Relationship between strength and total quantity. - Dilution and concentration of liquids. - Stock Solution. - Dilution of Alcohol. - Alligation	2	4
10	Parenteral medications	a1, a2, b1, b2, c1, c2, d1, d2	- Intravenous calculations - Total parenteral nutrition (TPN) therapy - IV flow rates - IV time calculations - Alligation method in TPN preparation	1	2
11	Final exam	a1, a2, b1, b2, c1, c2		1	2
Number of Weeks /and Units Per Semester				16	32

V. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Assignment 1	6th	5	a1, a2, b1, b2, c1, c2, d1, d2
Total				5

VI. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	6 th	5	5%	a1, a2, b1, b2, c1, c2, d1, d2
3	Midterm Exam	Week 7	20	20%	a1, a2, b1, b2, c1, c2
4	Quiz 2	12 th	5	5%	a1, a2, b1, b2, c1, c2
5	Final Exam (Theory)	Week 16	70	70%	a1, a2, b1, b2, c1, c2
Total			100	100%	

VII. Learning Resources:

1- Required Textbook(s):	
	1- Ansel , Howard C. , Stockton , Shelly Janet Prince (2016).Pharmaceutical Calculations 15th edition. Lippincott Williams and wilkins.. 2- Judith A. Rees and Brian Smith. (2010). Introduction to pharmaceutical calculation. 3rd edition. Pharmaceutical press.
2- Essential References.	
	1- Thompson JE. (1998):A Practical Guide to Contemporary Pharmacy Practice. Baltimore,Md: Lippincott Williams and Wilkins.
3- Electronic Materials and Web Sites etc.	
	1. http://www.pharmatutor.org 2. http://www.uspbpep.com 3. http://www.usp.org

VIII. Course Policies: (Based on the Uniform Students' By law (2007))

Class Attendance:	
1	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.
Tardiness:	
2	A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
Exam Attendance/Punctuality:	
3	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.
Assignments & Projects:	
4	Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
Cheating:	
5	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.
Forgery and Impersonation:	
6	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.
Other policies:	
7	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.

Faculty of Clinical Pharmacy

Bachelor of Clinical Pharmacy & Pharm. D.

Course Plan (Syllabus) of **Pharmaceutical Calculation**

Course Code. 02.02.228

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member:	Mohammed addoais	Office Hours					
Location& Telephone No.:	776440327						
E-mail:	Addoais1@gmail.com	SAT	SUN	MON	TUE	WED	THU

2022- 2023

II. Course Identification and General Information:

12.	Course Title:	Pharmaceutical Calculation			
13.	Course Code:	02.02.228			
14.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours
			Lecture	Tutorial/Seminar	Lab Clinical
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15.	Level/ Semester at which this Course is offered:	2 nd Level/ 1 st Semester			
16.	Pre –Requisite (if any):	- General chemistry			
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18.	Program (s) in which the Course is Offered:	Bachelor of Clinical Pharmacy & Pharm. D.			
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IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

A. Knowledge and Understanding:

- | | |
|----|---|
| a1 | List different measurement systems used in pharmacy. |
| a2 | Carry out conversions between units of different systems. |

B. Intellectual Skills:

- | | |
|----|--|
| b1 | Explain dilution and concentration of pharmaceutical preparations. |
| b2 | Use formula to calculate amounts of substances needed to compound pharmaceuticals. |

C. Professional and Practical Skills:

- | | |
|----|--|
| c1 | Prepare the student to carry out all interpretations and conversions found in prescriptions |
| c2 | Illustrate the basic skills to calculate dosage and concentration in different pharmaceutical dosage forms |

D. Transferable Skills:

- | | |
|----|---|
| d1 | Illustrate the ability to read and interpret prescriptions. |
| d2 | Able to communicate with the physicians and patients. |

V. Course Contents:

A. Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact Hours
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2	Prescription	a1, a2, b1, b2, c1, c2, d1, d2	- Interpretation of the prescription or medication order. - Range of prescription and medication order calculations.	2	4

			- Prescription and medication order accuracy. - Use abbreviations and symbols		
3	Units of measurement	a1, a2, b1, b2, c1, c2, d1, d2	- The Metric System. - Measurement of Length, Volume, and Weight. - Relation of Metric to other systems of Measurement. - Temperature conversion	2	4
4	Posology	a1, a2, b1, b2, c1, c2, d1, d2	- General considerations - Dose definitions. - Routes of drug/dose administration and dosage forms. - Dose measurement general dose calculations. - Calculation of doses according to patient parameters, pediatric patient, geriatric patient. - Drug dosage based on age, drug dosage based on weight or body surface area.	2	4
5	Density and specific gravity	a1, a2, b1, b2, c1, c2, d1, d2	- Density, Specific Gravity and specific volume. - Use of Specific Gravity in Calculation of Weight and Volume.	1	2
6	Mid-term Exam			1	2
7	Electrolyte solutions	a1, a2, b1, b2, c1, c2, d1, d2	- Milliequivalents - Millimoles - Osmolarity - Milliosmoles	1	2
8	Isotonic and buffer solution calculations	a1, a2, b1, b2, c1, c2, d1, d2	- Isotonic and Buffer Solutions. - Special Clinical Considerations of Tonicity. - Physical/Chemical considerations in the preparation of isotonic Solutions. - Buffers and Buffer Solutions.	1	2
9	Dilution, Concentration and Alligation	a1, a2, b1, b2, c1, c2, d1, d2	- Special considerations of dilution and concentration in pharmaceutical compounding. - Relationship between strength and total quantity. - Dilution and concentration of	2	4



			liquids. ▪ Stock Solution. ▪ Dilution of Alcohol. ▪ Alligation		
10	Parenteral medications	a1, a2, b1, b2, c1, c2, d1, d2	▪ Intravenous calculations ▪ Total parenteral nutrition (TPN) therapy ▪ IV flow rates ▪ IV time calculations ▪ Alligation method in TPN preparation	1	2
11	Final exam	a1, a2, b1, b2, c1, c2	▪	1	2
Number of Weeks /and Units Per Semester				16	32

- VI. Teaching Strategies of the Course:

- Lecture
- Instructor – student Interactive
- Exercises
- Presentation
- Office hours
- Seminar
- Assignment
- Self-Learning

VII. Assessment Methods of the Course:

- Assignments
- Quiz
- Exam
- Oral Presentation



No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Assignment 1	6 th	5	a1, a2, b1, b2, c1, c2, d1, d2
Total				5

VI. Schedule of Assessment Tasks for Students During the Semester:

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