Al-Mansour University College

Department of Pharmacy

Pharmaceutical Calculations Course Description

1. Course Name	
Pharmaceutical Calculations Subject area: Pharmaceutics	
2. Course Code	
PHA12102	
3. Semester and Year	
First Year / Second Semester Total credits: 4 | Theory credits: 3 | Practical credits: 1	
4. Date this description was prepared	
23/8/2026	
5. Available attendance forms	
On-campus theoretical lectures and practical laboratory classes.	
6. Total academic hours	
Weekly contact hours: 5 (3 theory + 2 practical). Semester totals over 15 weeks: 45 theory + 30 practical = 75 contact hours. Credit hours: 4 (3 theory credits + 1 practical credit).	
7. Name of course coordinator(s)	
Name and academic title: Prof. Dr. Firas Aziz Rahi Email: firas.aziz@muc.edu.iq	
8. Course objectives	
Objectives of the study subject	By the end of the course, students should be able to: 1. Interpret prescriptions and medication orders accurately and safely. 2. Apply measurement systems and determine doses for different patient needs and parameters. 3. Reduce and enlarge pharmaceutical formulas accurately. 4. Calculate percentage strength, ratio strength, density, specific gravity, and specific volume. 5. Prepare and evaluate isotonic solutions for physiological compatibility. 6. Calculate milliequivalents, millimoles, and milliosmoles in electrolyte solutions. 7. Apply calculations for intravenous admixtures, infusion rates, and intravenous therapy.

9. Teaching and learning strategies	
Teaching strategies	Interactive lectures, worked calculations, prescription examples, and guided problem-solving. Laboratory teaching uses equipment demonstrations, supervised measurements, preparation exercises, and discussion of calculated results.
Learning strategies	Individual and small-group calculations, unit conversion exercises, guided reading, laboratory records, and interpretation of preparation requirements. Students check units, calculation accuracy, and the reasonableness of results, with formative feedback.

10. Theoretical course structure

Three theoretical contact hours per week over 15 weeks. The topics are arranged in consecutive teaching weeks.

Wk	Hrs	Required learning outcomes	Name of the unit or topic	Learning method	Evaluation method
1	3	Interpret prescription components and medication orders.	Interpretation of prescriptions or medication orders.	Lecture; worked examples	Calculation exercises; quiz
2	3	Convert between measurement systems and express quantities in appropriate units.	Systems of measurement.	Lecture; worked examples	Calculation exercises; quiz
3	3	Calculate density, specific gravity, and specific volume.	Density, specific gravity, and specific volume.	Lecture; worked examples	Calculation exercises; quiz
4	3	Calculate percentage strength in pharmaceutical preparations.	Percent strength, ratio strength, and other concentration expressions — part I.	Lecture; worked examples	Calculation exercises; quiz
5	3	Convert between ratio strength and other concentration expressions.	Percent strength, ratio strength, and other concentration expressions — part II.	Lecture; worked examples	Calculation exercises; quiz
6	3	Calculate doses from prescribed strengths and quantities.	Calculation of doses — part I.	Lecture; worked examples	Calculation exercises; quiz

Wk	Hrs	Required learning outcomes	Name of the unit or topic	Learning method	Evaluation method
7	3	Determine doses using relevant patient parameters.	Calculation of doses using patient parameters — part II.	Lecture; worked examples	Calculation exercises; quiz

10. Theoretical course structure continued					
Wk	**Hrs**	**Required learning outcomes**	**Name of the unit or topic**	**Learning method**	**Evaluation method**
8	3	Scale ingredient quantities while maintaining formula proportions.	Reducing and enlarging formulas.	Lecture; worked examples	Calculation exercises; quiz
9	3	Calculate strength adjustments, stock solution quantities, and mixtures using alligation.	Altering product strength; stock solutions; alligation.	Lecture; worked examples	Calculation exercises; quiz
10	3	Perform calculations for isotonic preparations.	Isotonic and buffer solutions — part I.	Lecture; worked examples	Calculation exercises; quiz
11	3	Perform calculations for buffer preparations.	Isotonic and buffer solutions — part II.	Lecture; worked examples	Calculation exercises; quiz
12	3	Calculate millimoles and milliequivalents in electrolyte solutions.	Electrolyte solutions: milliequivalents and millimoles.	Lecture; worked examples	Calculation exercises; quiz
13	3	Calculate milliosmoles and interpret electrolyte concentration expressions.	Electrolyte solutions: milliosmoles and integrated calculations.	Lecture; worked examples	Calculation exercises; quiz
14	3	Calculate quantities and concentrations for parenteral admixtures.	Intravenous infusions and parenteral admixtures.	Lecture; worked examples	Calculation exercises; quiz
15	3	Calculate infusion flow rates and administration times.	Intravenous infusions: rate-of-flow calculations.	Lecture; worked examples	Calculation exercises; quiz

Total theoretical contact hours: 45

10. Practical course structure

Two practical contact hours per week over 15 weeks. Each 4-hour topic is allocated two consecutive weekly sessions.

Week	Hrs	Practical subject and expected learning outcome
1	2	Demonstration of pharmacy glassware and equipment. Identify common items and explain their uses.
2–3	4	Pharmaceutical measurements. Perform measurements using suitable equipment, record units, and assess measurement accuracy.
4–5	4	Volume measurements. Select appropriate volumetric equipment and measure and record liquid volumes.
6–7	4	Calculations involving liquid pharmaceutical preparations. Determine ingredient quantities and concentrations for the assigned preparations.
8–9	4	Calculations involving buffer and isotonic liquid preparations. Calculate required ingredient quantities for the assigned exercises.
10–11	4	Reducing and enlarging prescription contents. Adjust ingredient quantities to the required preparation size while preserving proportions.
12–13	4	Percentages in calculating prescription contents. Apply percentage strength calculations to determine quantities and concentrations.
14–15	4	Stock solutions and dilution techniques during dispensing. Calculate stock volumes and diluent quantities and apply the assigned dilution technique.
Total	30	15 weeks × 2 practical contact hours.

Practical learning methods: demonstration, supervised measurement and preparation, calculation exercises, and discussion. Evaluation methods: observation of practical performance, calculation accuracy, laboratory reports, oral questions, and practical examinations.

11. Course evaluation

Assessment covers theoretical calculations and practical measurement and preparation skills, with a total score of 100 marks. The proposed distribution below is subject to departmental approval.

Assessment component	Marks
Coursework, quizzes, and assignments	10
Mid-semester theoretical examination	20
Practical assessment and examinations	10
Final theoretical examination	60
Total	100

12. Learning and teaching resources

Main reference	Howard C. Ansel. Pharmaceutical Calculations. 15th edition, 2017.
Practical resources	Department-provided laboratory instructions, prescription exercises, and measurement and preparation worksheets.
Recommended supporting materials	Worked calculation examples, measurement conversion tables, and formula adjustment exercises selected by the course coordinator.
Electronic references and websites	Department-designated electronic lecture materials, practice exercises, and relevant equipment instructions.

13. Course Development Plan

Review calculation exercises and laboratory instructions regularly, strengthen the connection between numerical calculations and practical preparation, and incorporate feedback on common errors in units, concentrations, dose calculations, and dilution. Use assessment results to improve students’ accuracy in interpreting orders and checking calculations.