



**COWLEY COLLEGE
& Area Vocational Technical School**

COURSE PROCEDURE FOR

**PHARMACOLOGY CALCULATIONS
ALH5245 3 Credit Hours**

Student Level:

This course is open to students on the college level in either the freshman or sophomore year.

Catalog Description:

ALH5245 - PHARMACOLOGY CALCULATIONS (3 hrs)

This course is designed to help a student increase his/her knowledge concerning medication calculations in the clinical setting and would be very useful for anyone responsible for the administration of pharmaceutical agents. Upon completion of the course, the student will be able to safely and accurately calculate the correct dosage for a wide range of medications. This course is taught by a health care professional that has clinical practice with calculating dosages and administering a wide range of medications. This course does not fulfill a math requirement at the college.

Prerequisites:

None.

Controlling Purpose:

This course is designed to help a student increase his/her knowledge concerning medication calculations in the clinical setting and would be very useful for anyone responsible for the administration of pharmaceutical agents.

Learner Outcomes:

Upon completion of the course, the student will be able to safely and accurately calculate the correct medication dosage for a wide range of pharmaceutical agents.

Units Outcomes and Criterion Based Evaluation Key for Core Content:

The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:

- A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the

less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.

- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

UNIT 1: GENERAL MATHEMATICS

Outcomes: The student will gain an understanding of general mathematics concepts.

A	B	C	D	F	N	Specific Competencies The student will demonstrate the ability to:
						Add, subtract, multiply, and divide fractions and mixed numbers.
						Convert improper fractions and mixed numbers.
						Reduce fractions to lowest terms.
						Create equivalent fractions and compare values.
						Add, subtract, multiply, and divide decimals.
						Compare decimal values.
						Round decimals.
						Convert decimals, fractions and percentages.

UNIT 2: RATIO AND PROPORTION

Outcomes: The student will develop the ability to set up ratio and proportion equations used in dosage calculation.

A	B	C	D	F	N	Specific Competencies The student will demonstrate the ability to:
						Express ratios as fractions.
						Reduce fractions to lowest numerical terms.
						Solve verbal and numerical ration/proportion problems for x.
						Solve one-step ratio/proportion problems.

						Estimate answers.
						Prove answers.

UNIT 3: SAFE MEDICATION ADMINISTRATION

Outcomes: Students will gain an understanding of theories and practices that are involved with safe medication administration.

A	B	C	D	F	N	Specific Competencies
						The student will demonstrate the ability to:
						Identify the knowledge and skills needed for the safe administration of medications.
						Describe safe practices that reduce medication errors.
						Interpret medication-related abbreviations and medication labels.
						Identify equipment for oral medication administration.
						Identify oral and liquid forms of medications.
						Identify key characteristics of medication administration records (MARs).
						Convert time to military hours.
						Explain the need for incident reports.
						Analyze medication errors using critical thinking.

UNIT 4: DRUG MEASUREMENTS AND DOSE CALCULATIONS

Outcomes: The student will be able to describe drug measurements and accurately calculate dose calculations.

A	B	C	D	F	N	Specific Competencies
						The student will demonstrate the ability to:
						Convert milligrams, micrograms, grams and kilograms to other metric measurements.
						State metric conversion factors.
						Calculate gram and milligram conversion problems.
						Round medication dosages to the nearest measurable amount.
						Identify metric and household liquid equivalents.
						Identify one- and two-step metric conversion problems.
						Distinguish unit and milliequivalent labels.

						Calculate one- and two-step oral and parenteral metric conversion problems by the ratio-proportion method.
						Distinguish metric, household and apothecary terms.
						Analyze medication errors using critical thinking.

UNIT 5: MEDICATIONS FROM POWDERS AND CRYSTALS: ORAL AND INTRAMUSCULAR

Outcomes: The student will understand practice related to safely and accurately reconstituting medications used for patient care.

A	B	C	D	F	N	Specific Competencies
						The student will demonstrate the ability to:
						Read reconstitution labels to determine specific diluents, diluent amounts, specific doses, conditions for usage and expiration dates.
						State the importance of initialing and writing the date and time of reconstitution on the medication vial or bottle.
						Determine the best dilution strength to use for multiple-dosage strength vials.
						Calculate dosages in milliliters, grams and milligrams for oral and parenteral routes.

UNIT 6: BASIC INTRAVENOUS CALCULATIONS

Outcomes: The student will understand basic IV calculation theory and equipment used for patient care.

A	B	C	D	F	N	Specific Competencies
						The student will demonstrate the ability to:
						Calculate IV flow rates for gtt/min, mL/hr, mg/g/hr and infusion time.
						Interpret IV labels.
						Identify various electronic IV infusion devices.
						Identify the various types of IV sets.
						Calculate the amount of saline or heparin for use in keeping venous access patent.
						Calculate the grams of sodium chloride or dextrose in IV bags.
						Check a physician's IV order for type of solution, amount, additives and rate.
						Analyze IV orders for safe administration using critical thinking skills.

UNIT 7: ADVANCED INTRAVENOUS CALCULATIONS

Outcomes: The student will understand advanced IV calculation theory and be able to perform accurate calculations.

A	B	C	D	F	N	Specific Competencies
						The student will demonstrate the ability to:
						Calculate milligrams per kilogram, micrograms per kilogram per minute and per hour infusion rates.
						Calculate hourly drug dose and hourly flow rate for IV solutions.
						Estimate and calculate infusion rates and drug doses using ratio and proportion.
						Calculate time/dose intervals for direct IV bolus medications administered with a syringe.
						Evaluate existing infusions for correct flow rate and/or drug dosage.
						Analyze IV medication errors using critical thinking.

UNIT 8: PARENTERAL NUTRITION

Outcomes: The student will be able to calculate parenteral nutrition doses.

A	B	C	D	F	N	Specific Competencies
						The student will demonstrate the ability to:
						Calculate grams of protein, dextrose and lipids per order.
						Calculate the percentage of protein, dextrose and lipids per order.
						Discuss the reasons that different concentrations of additives are used in peripheral and central lines.
						Calculate the percentage of additives per infusion.
						Calculate the kilocalories for protein, dextrose and lipids per infusion.
						Calculate the total kilocalories per infusion.
						Compare the ordered amount of parenteral nutrition with the infusion label.

UNIT 9: INSULIN ADMINISTRATION

Outcomes: The student will understand practice related to safely and accurately administering insulin.

A	B	C	D	F	N	Specific Competencies
						The student will demonstrate the ability to:
						Identify sites for insulin injections.
						Identify the different types of insulin.

						Compare the actions of fast-, intermediate- and long-acting insulins.
						Read calibrations on 30-, 50- and 100-unit insulin syringes.
						Prepare single- and mixed-dose insulin injections.
						Calculate units of insulin based on CHO grams.
						Interpret the sliding scale using the BMBG method.
						Calculate IV insulin dose for units/hr and mL/hr.
						Analyze medication errors using critical thinking.

UNIT 10: ANTICOAGULANT ADMINISTRATION

Outcomes: The student will understand practice related to safely and accurately administering anticoagulants.

A	B	C	D	F	N	Specific Competencies
						The student will demonstrate the ability to:
						Compare the actions of oral, subcutaneous and intravenous anticoagulants.
						Calculate a dose in a TB syringe.
						Calculate dosages using various concentrations on hand.
						Calculate IV anticoagulant drip rates.
						Analyze medication errors using critical thinking.

UNIT 11: PEDIATRIC DOSAGES

Outcomes: The student will understand practice related to safely and accurately administering medications to pediatric patients.

A	B	C	D	F	N	Specific Competencies
						The student will demonstrate the ability to:
						Calculate 24 hour pediatric drug doses and divided dosages for specific patient weights.
						Calculate safe dosage ranges in mg/kg, mcg/kg and square meters of body surface area (BSA).
						Calculate reconstituted pediatric drug dosages and small-volume IV flow rates for children.
						Evaluate order and safe dose range calculations.

						Evaluate the safety of a mock order.
						Analyze medication errors using critical thinking.

UNIT 12: DIMENSIONAL ANALYSIS

Outcomes: Students will gain an understanding of dimensional theory medication administration practice.

A	B	C	D	F	N	Specific Competencies
						The student will demonstrate the ability to:
						Set up problems in the correct format using dimensional analysis.
						Perform common metric conversions using dimensional analysis.
						Calculate intramuscular and subcutaneous doses.
						Calculate IV piggyback doses.
						Calculate IV insulin and heparin doses.

Projects Required:

Projects may vary according to the instructor.

Textbook:

Contact Bookstore for current textbook.

Materials/Equipment Required:

Computers and printers.

Internet.

Attendance Policy:

Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

Grading Policy:

The grading policy will be outlined by the instructor in the course syllabus.

Maximum class size:

Based on classroom occupancy

Course Time Frame:

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established

equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

Refer to the following policies:

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

Disability Services Program:

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability which may impact work in this class and which requires accommodations, contact the Disability Services Coordinator.