FACULTY OF HEALTH SCIENCES AND SPORTS

BACHELOR OF SCIENCE IN BIOMEDICAL TECHNOLOGY

(PHARMACY TECHNOLOGY)

LEARNING MODULE OUTLINE

Academic Year	2024-2025	Semester	1
Module Code	BSDT1101		
Learning Module	Basic Dispensing Techniques 1		
Pre-requisite(s)	Nil		
Medium of Instruction	Chinese / English		
Credits	4	Contact Hours	60
Instructor	Pedro Fong	Email	pedrofong@mpu.edu.mo
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MODULE DESCRIPTION

This module will familiarise students with a wide range of pharmaceutical dosage forms and formulations, enabling them to develop a thorough comprehension of the underlying principles and techniques involved. This module specifically delves into the key dosage forms encountered during extemporaneous dispensing. Through comprehensive instruction and hands-on experience, students will be equipped with the essential knowledge and practical skills necessary for a career in dispensing pharmacy practice. Additionally, they will gain an understanding of the factors influencing dosage form selection, compounding techniques, quality assurance, and the importance of maintaining accurate records in accordance with regulatory standards.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

On completion of this learning module, students will be able to:

M1.	Utilize common pharmaceutical reference resources effectively to gather accurate and up-to-date information.
M2.	Demonstrate an understanding of the meaning, functions, and requirements of a prescription in the context of pharmacy practice.
M3.	Apply pharmaceutical calculations accurately in various dosage calculations, including conversions, dilutions, and compounding measurements.
M4.	Analyse and explain the concepts of different dosage forms and formulations, including the roles and functions of various excipients in pharmaceutical preparations.
M5.	Demonstrate practical skills in extemporaneous compounding and dispensing for a diverse range of pharmaceutical products, encompassing solutions, suspensions, emulsions, ointments, creams, pastes, powders, and capsules.
M6.	Generate accurate and appropriate medication labels, including essential information such as dosage instructions, patient details, and auxiliary warnings, ensuring clarity and compliance with regulatory requirements.

These ILOs aim to enable students to attain the following Programme Intended Learning Outcomes (PILOs):

PILOs	M1	M2	M3	M4	M5	M6
P1. To demonstrate understanding of a range of subjects, fields, principles and approaches relevant to pharmacy technology	✓	✓	✓	✓	✓	✓
P2. To demonstrate an understanding of theories, analytical approaches and practices that underpin pharmacy operations and management	✓	✓	✓	✓	✓	✓
P3. To demonstrate understanding of major trends and issues related to pharmacy technology	✓					
P4. To apply professional knowledge and skills to analyse, interpret and solve problems, challenges and risks in pharmacy practice	✓					✓
P5. To critically appraise and interpret scientific and clinical literature and apply evidence-based practice	✓					✓
P6. To acquire and apply research skills in pharmacy technology	✓					
P7. To demonstrate effective communication and teamwork skills					✓	
P8. To maintain professional and ethical standards in pharmacy practice and research	✓					✓

MODULE SCHEDULE, COVERAGE AND STUDY LOAD

Week	Content Coverage	Contact Hours
3	Introduction • Course introduction • Pharmaceutical reference resources – introduction to reference books and electronic resources, including Martindale, AHFS Drug Information, Merck Index, MIMS, British National Formulary, Applied Therapeutics and different national pharmacopoeia.	1

3	Medicine Presentation and Administration I
	• Definition of medicinal products
	• Source of drugs
	• "Rights" of medicine administration
	• Route of administration
	• Choice of route – systemic and local effect
	• Introduction to oral route of administration:
	  ○ Tablets – effervescent, enteric-coated, modified release, sublingual and buccal
	  ○ Capsule – soft and hard
	  ○ Liquid formulation – solution, emulsion and suspension
		2

3/4	Medicine Presentation and Administration II
	• Introduction to topical route of administration:
	  ○ Transdermal drug delivery
	  ○ Nasal
	  ○ Ophthalmic
	  ○ Otic
		2

	○ Rectal ○ Vaginal ○ Parenteral • Introduction to Standard Operating Procedures (SOPs) ○ Definition of SOP ○ Contents and usages ○ Advantages and Disadvantages ○ Examples	
4	Dispensing of Prescription • Definition of prescription • Legal requirement of prescription • General dispensing procedure • Common abbreviations used within pharmacy	2
4	Storage and Labelling Requirements • Appearance and contents of labels • Containers and packaging • Adsorption applications and problems • Auxiliary labels for extemporaneous preparations • Discard dates for extemporaneous preparations • Standards for extemporaneous dispensing • Good pharmaceutical practice • Storage and stability • Preservation of medicines	1
4	Mathematical principles of drug therapy I • Metric units • Amount strength • Ratio strength • Parts per million • Percentage concentration • Dilutions	3
4/5	Mathematical principles of drug therapy II • Density, displacement volumes and displacement values • Calculations on amount of ingredients • Calculation of doses: ○ Age ○ Bodyweight ○ Body surface area ○ Rate of flow of intravenous solutions	4
5	Solutions • Formulation of solutions • Choice of vehicle: ○ Aqueous solutions ○ Non-aqueous solutions: ○ Fixed oils of vegetable origin ○ Alcohols • Solubility control: ○ Cosolvency ○ pH control ○ Solubilization ○ Complexation	2

	○ Chemical modification • General method in extemporaneous solution preparation • Examples of extemporaneous solution compounding: ○ Ammonium Chloride Mixture BP ○ Alkaline Gentian Mixture BP	
5	Laboratory session 1 • Preparation of potassium permanganate 0.2% (w/v) solution • Calculations and questions	2
5	Laboratory session 2 • Preparation of sodium compound mouthwash BP • Calculations and questions	2
5	Suspensions • Diffusible and indiffusible suspensions • Suspending agents • Physical stability of suspensions • Release of drugs from suspensions • General method in extemporaneous suspension preparation: ○ Diffusible ○ Indiffusible • Examples of extemporaneous suspension compounding: ○ Paediatric Chalk Mixture BP ○ Magistral formulation for a hospital formula	2
5/6	Laboratory session 3 • Preparation of sulfamethoxazole/trimethoprim suspension • Calculations and questions	2
6	Laboratory session 4 • Magnesium Trisilicate Mixture BP • Calculations and questions	2
7	Emulsions • Formulation of emulsions • Emulsifying agents • Physical stability of emulsions • General method in extemporaneous emulsion preparation • Dilution of primary emulsion • Examples of extemporaneous emulsion compounding ○ Arachis oil BP emulsion with peppermint flavouring	2
7	Laboratory session 5 • Preparation of cod liver oil 30% v/v emulsion • Calculations and questions	2
8	Laboratory session 6 • Liquid paraffin 15% emulsion • Calculations and questions	2
8	Midterm Test	2
9	Creams, ointments, pastes and gels • Formulation of creams, ointments, pastes and gels • Trituration and levigation • General method in creams, ointments, pastes and gels preparation: ○ Incorporation of solid into a cream base ○ Incorporation of liquid into a cream base	2

	○ Incorporation of powders into an ointment base ○ Incorporation of liquid into an ointment base • Examples of extemporaneous compounding: ○ Cetrimide cream BP ○ Salicylic acid and sulphur cream BP ○ Dermovate cream 25% ○ Simple ointment BP ○ Calamine and coal tar ointment BP ○ Zinc ointment BP ○ CSS & S ointment ○ Salicylic acid 2% in Betnovate ointment ○ Compound zinc paste BP ○ Dithranol Paste BP	
9	Laboratory session 7 • Preparation of simple ointment BP • Calculations and questions	2
10	Laboratory session 8 • Preparation of emulsifying ointment BP • Calculations and questions	2
10	Calculation test	1
10	Laboratory session 9 • Preparation of aqueous cream BP • Calculations and questions	2
11	Laboratory session 10 • Preparation of zinc and coal tar paste BP • Calculations and questions	2
11	Laboratory session 11 • Preparation of compound zinc paste BP • Calculations and questions	2
12	Powders, capsules and therapeutic aerosols • Types of capsules: ○ Hard gelatine ○ Soft gelatine • Raw materials: ○ Gelatin ○ Water ○ Colourants • Others: process aids, preservatives and plasticizers • Manufacture of capsule: ○ Preparation of gelatine solution ○ Capsules size ○ Capsules shell filling ○ Capsules machines	2
12/13	Laboratory sessions 12 and 13 • Preparation of Compound Magnesium Trisilicate powders BP • Preparation of Zinc, starch and talc dusting powder • Calculations and questions	3
13	Laboratory session 14 • Preparation of codeine phosphate powders	2

	• Calculations and questions	
13	Laboratory session 15 • Preparation of codeine phosphate capsules • Calculations and questions	3
17	Final Examination	2

TEACHING AND LEARNING ACTIVITIES

In this learning module, students will work towards attaining the ILOs through the following teaching and learning activities:

Teaching and Learning Activities	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
T1. Interactive lectures	✓		✓	✓		
T2. Practical demonstrations		✓	✓		✓	✓
T3. Patient case studies	✓	✓	✓	✓		
T4. Laboratory sessions	✓	✓	✓	✓	✓	✓
T5. Test and examination	✓	✓	✓	✓	✓	✓
T6. Multimedia resources (videos, podcasts, or online resources)				✓	✓	✓

ATTENDANCE

Attendance requirements are governed by the Academic Regulations Governing Bachelor's Degree Programmes of the Macao Polytechnic University. Students who do not meet the attendance requirements for the learning module shall be awarded an 'F' grade.

ASSESSMENT

In this learning module, students are required to complete the following assessment activities:

Assessment Activities	**Weighting (%)**	**ILOs to be Assessed**
A1. Exercises	10	M1, M2, M3, M4, M6
A2. Pharmaceutical calculations	20	M1, M2, M3
A3. Midterm test	20	M2, M3, M4, M5, M6
A4. Final examination	50	M2, M3, M4, M5, M6

This learning module is graded on a 100-point scale, with 100 being the highest possible score and 50 being the passing score. Any students scoring less than 35% of the total mark in the final examination will be given an "F" grade for the module even if the overall grade is 50% or higher.

Any student attaining less than 90% in practical sessions will be given an "F' grade, regardless of the score achieved in the coursework and assignment.

The assessment will be conducted following the University's Assessment Strategy (see www.mpu.edu.mo/teaching_learning/en/assessment_strategy.php). Passing this learning module indicates that students will have attained the ILOs of this learning module and thus acquired its credits.

MARKING SCHEME

High grades will be awarded for work that demonstrates exceptional understanding and mastery of the subject matter and consistently exceeds expectations. The following are the general assessment criteria for the assessment activities.

Assessment Activities	Assessment Criteria	Mark Ranges				
		88-100	73-87	58-72	50-57	<50
A1. Exercise	Demonstrate active participation and engagement in class/online exercises, effectively contributing to discussions and group activities.	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels
A2. Pharmaceutical calculations	Performs pharmaceutical calculations with precision and accuracy, demonstrating a comprehensive understanding of the underlying mathematical principles.	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels
A3. Midterm test	Demonstrate a comprehensive knowledge and understanding of key concepts, theories, and practical applications covered in the course material up	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels
A4. Final examination	Demonstrate an in-depth understanding of the entire course material, including theoretical concepts and practical applications.	Excellent	Good/ Very Good	Satisfactory	Marginal Pass	Fail; not reaching marginal levels

REQUIRED READINGS

J. F. Marriott, K. A. Wilson, C. A. Langley and D. Belcher. (2010) Pharmaceutical Compounding and Dispensing, 2nd edition, Pharmaceutical Press.

Reading materials, such as lecture notes and journal articles, will be provided to the students by the instructors of this module.

REFERENCES

British Pharmacopoeia Commission. (2022) British Pharmacopoeia 2022.

United States Pharmacopoeial Convention. (2013) The United States pharmacopoeia: the national formulary 37th revision / NF 32nd edition

L. V. Allen. (2020) The Art, Science, and Technology of Pharmaceutical Compounding, 6th Edition. American Pharmaceutical Association. ISBN: 1582123578

J. Mark & L. Andrew. (2010) Handbook of extemporaneous preparation: a guide to pharmaceutical compounding. Pharmaceutical Press. ISBN: 9780853699019

STUDENT FEEDBACK

At the end of every semester, students are invited to provide feedback on the learning module and the teaching arrangement through questionnaires. Your feedback is valuable for instructors to enhance the module and its delivery for future students. The instructor and programme coordinators will consider all feedback and respond with actions formally in the annual programme review.

ACADEMIC INTEGRITY

The Macao Polytechnic University requires students to have full commitment to academic integrity when engaging in research and academic activities. Violations of academic integrity, which include but are not limited to plagiarism, collusion, fabrication or falsification, repeated use of assignments and cheating in examinations, are considered as serious academic offenses and may lead to disciplinary actions. Students should read the relevant regulations and guidelines in the Student Handbook which is distributed upon the admission into the University, a copy of which can also be found at www.mpu.edu.mo/student_handbook/.