

Macao Polytechnic Institute
School of Health Sciences and Sports
Bachelor of Science in Biomedical Technology
(Pharmacy Technology)

Module Outline

Academic Year 2021 / 2022 Semester 1

Learning Module	Basic Dispensing Techniques 1			Class Code	BSDT1101
Pre-requisite(s)	Nil				
Medium of Instruction	Chinese / English			Credit	4
Lecture Hours	30 hrs	Lab/Practice Hours	30 hrs	Total Hours	60 hrs
Instructor	Pedro Fong		E-mail	pedrofong@ipm.edu.mo	
Office	Rm. M705, Meng Tak Building, Main Campus		Telephone	85993427	

Description

This learning module will familiarise students with the concepts of various pharmaceutical dosage forms and formulations. Theoretical and practical aspects of pharmacy practice, relating to the key dosage forms encountered within extemporaneous dispensing are emphasized. The learning module duration is 60 hours, including 30 hours of lectures, 30 hours of laboratory sessions, one mid-term test and one final exam.

Learning Outcomes

After completing the learning module, students will be able to:

1. Use common pharmaceutical reference resources.
2. Define the meaning, functions and requirements of a prescription.
3. Explain the storage and labelling requirements for pharmaceuticals.
4. Perform pharmaceutical calculations.
5. Describe the concepts of different dosage forms and formulations with regard to the roles of various excipients.
6. Use common extemporaneous dispensing equipment for weighing, measuring and mixing of pharmaceuticals.

7. Explain the techniques in pharmaceutical extemporaneous preparations.
8. Practice extemporaneous compounding and dispensing for various pharmaceutical products, including solutions, suspensions, emulsion, ointments, creams, pastes, powders and capsules.
9. Generate appropriate medication labels.

Content

1. Introduction (2 class hours)
 - 1.1 Course introduction
 - 1.2 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.

2. Medicine Presentation and Administration I (2 class hours)
 - 2.1 Definition of medicinal products
 - 2.2 Source of drugs
 - 2.3 “Rights” of medicine administration
 - 2.4 Route of administration
 - 2.5 Choice of route – systemic and local effect
 - 2.6 Introduction to oral route of administration:
 - 3.11.1 Tablets – effervescent, enteric-coated, modified release, sublingual and buccal
 - 3.11.2 Capsule – soft and hard
 - 3.11.3 Liquid formulation – solution, emulsion and suspension

3. Medicine Presentation and Administration III (2 class hours)
 - 3.1 Introduction to topical route of administration:
 - 3.1.1 Transdermal drug delivery
 - 3.1.2 Nasal
 - 3.1.3 Ophthalmic
 - 3.1.4 Otic
 - 3.1.5 Rectal
 - 3.1.6 Vaginal
 - 3.1.7 Parenteral
 - 3.2 Introduction to Standard Operating Procedures (SOPs)
 - 3.2.1 Definition of SOP
 - 3.2.2 Contents and usages
 - 3.2.3 Advantages and Disadvantages
 - 3.2.4 Examples

4. Dispensing of Prescription (2 class hours)
 - 4.1 Definition of prescription

- 4.2 Legal requirement of prescription
- 4.3 General dispensing procedure
- 4.4 Common abbreviations used within pharmacy

- 5. Storage and Labelling Requirements I (2 class hours)
 - 5.1 Appearance and contents of labels
 - 5.2 Containers and packaging
 - 5.3 Adsorption applications and problems
 - 5.4 Auxiliary labels for extemporaneous preparations
 - 5.5 Discard dates for extemporaneous preparations
 - 5.6 Standards for extemporaneous dispensing
 - 5.7 Good pharmaceutical practice
 - 5.8 Storage and stability
 - 5.9 Preservation of medicines

- 6. Mathematical principles of drug therapy I (2 class hours)
 - 6.1 Metric units
 - 6.2 Amount strength
 - 6.3 Ratio strength
 - 6.4 Parts per million
 - 6.5 Percentage concentration
 - 6.6 Dilutions

- 7. Mathematical principles of drug therapy II (2 class hours)
 - 7.1 Density, displacement volumes and displacement values
 - 7.2 Calculations on amount of ingredients
 - 7.3 Calculation of doses:
 - 7.3.1 Age
 - 7.3.2 Bodyweight
 - 7.3.3 Body surface area
 - 7.4 Rate of flow of intravenous solutions

- 8. Solutions I (2 class hours)
 - 8.1 Formulation of solutions
 - 8.2 Choice of vehicle:
 - 8.2.1 Aqueous solutions
 - 8.2.2 Non-aqueous solutions:
 - 8.2.2.1 Fixed oils of vegetable origin
 - 8.2.2.2 Alcohols
 - 8.3 Solubility control:

- 8.3.1 Cosolvency
- 8.3.2 pH control
- 8.3.3 Solubilization
- 8.3.4 Complexation
- 8.3.5 Chemical modification
- 8.4 General method in extemporaneous solution preparation
- 8.5 Examples of extemporaneous solution compounding:
 - 8.5.1 Ammonium Chloride Mixture BP
 - 8.5.2 Alkaline Gentian Mixture BP

9. Laboratory session 1 (2 class hours)

- 9.1 Preparation of potassium permanganate 0.2% (w/v) solution
- 9.2 Calculations and questions

10. Laboratory session 2 (2 class hours)

- 10.1 Preparation of sodium compound mouthwash BP
- 10.2 Calculations and questions

11. Suspensions (2 class hours)

- 11.1 Diffusible and indiffusible suspensions
- 11.2 Suspending agents
- 11.3 Physical stability of suspensions
- 11.4 Release of drugs from suspensions
- 11.5 General method in extemporaneous suspension preparation:
 - 11.5.1 Diffusible
 - 11.5.2 Indiffusible
- 11.6 Examples of extemporaneous suspension compounding:
 - 11.6.1 Paediatric Chalk Mixture BP
 - 11.6.2 Magistral formulation for a hospital formula

12. Laboratory session 3 (2 class hours)

- 12.1 Preparation of sulfamethoxazole/trimethoprim suspension
- 12.2 Calculations and questions

13. Laboratory session 4 (2 class hours)

- 13.1 Magnesium Trisilicate Mixture BP
- 13.2 Calculations and questions

14. Emulsions (2 class hours)

- 14.1 Formulation of emulsions

- 14.2 Emulsifying agents
- 14.3 Physical stability of emulsions
- 14.4 General method in extemporaneous emulsion preparation
- 14.5 Dilution of primary emulsion
- 14.6 Examples of extemporaneous emulsion compounding
 - 14.6.1 Arachis oil BP emulsion with peppermint flavouring

15. Laboratory session 5 (3 class hours)

- 15.1 Preparation of cod liver oil 30% v/v emulsion
- 15.2 Calculations and questions

16. Laboratory session 6 (3 class hours)

- 16.1 Liquid paraffin 15% emulsion
- 16.2 Calculations and questions

17. Midterm Test (2 class hours)

- 18. Creams, ointments, pastes and gels (3 class hours)
 - 18.1 Formulation of creams, ointments, pastes and gels
 - 18.2 Trituration and levigation
 - 18.3 General method in creams, ointments, pastes and gels preparation:
 - 18.3.1 Incorporation of solid into a cream base
 - 18.3.2 Incorporation of liquid into a cream base
 - 18.3.3 Incorporation of powders into an ointment base
 - 18.3.4 Incorporation of liquid into an ointment base
 - 18.4 Examples of extemporaneous compounding:
 - 18.4.1 Cetrimide cream BP
 - 18.4.2 Salicylic acid and sulphur cream BP
 - 18.4.3 Dermovate cream 25%
 - 18.4.4 Simple ointment BP
 - 18.4.5 Calamine and coal tar ointment BP
 - 18.4.6 Zinc ointment BP
 - 18.4.7 CSS & S ointment
 - 18.4.8 Salicylic acid 2% in Betnovate ointment
 - 18.4.9 Compound zinc paste BP
 - 18.4.10 Dithranol Paste BP

19. Laboratory session 7 (2 class hours)

- 19.1 Preparation of simple ointment BP
- 19.2 Calculations and questions

20. Laboratory session 8 (2 class hours)

- 20.1 Preparation of emulsifying ointment BP
- 20.2 Calculations and questions

21. Laboratory session 9 (2 class hours)

- 21.1 Preparation of aqueous cream BP
- 21.2 Calculations and questions

22. Laboratory session 10 (2 class hours)

- 22.1 Preparation of zinc and coal tar paste BP
- 22.2 Calculations and questions

23. Laboratory session 11 (2 class hours)

- 23.1 Preparation of compound zinc paste BP
- 23.2 Calculations and questions

24. Laboratory session 12 and 13 (2 class hours)

- 24.1 Preparation of Compound Magnesium Trisilicate powders BP
- 24.2 Calculations and questions
- 24.3 Preparation of Zinc, starch and talc dusting powder
- 24.4 Calculations and questions

25. Powders, capsules and therapeutic aerosols (3 class hours)

25.1 Types of capsules:

- 25.1.1 Hard gelatine
- 25.1.2 Soft gelatine

25.2 Raw materials:

- 25.2.1 Gelatin
- 25.2.2 Water
- 25.2.3 Colourants
- 25.2.4 Others: process aids, preservatives and plasticizers

25.3 Manufacture of capsule:

- 25.3.1 Preparation of gelatine solution
- 25.3.2 Capsules size
- 25.3.3 Capsules shell filling
- 25.3.4 Capsules machines

26. Laboratory session 14 (2 class hours)

- 26.1 Preparation of codeine phosphate powders
- 26.2 Calculations and questions

27. Laboratory session 15 (2 class hours)

27.1 Preparation of codeine phosphate capsules

27.2 Calculations and questions

28. Final Examination (2 class hours)

Teaching Method

Lectures, videos, case studies, practices and group discussion

Attendance

Attendance requirements are governed by the “Academic Regulations Governing Bachelor’s Degree Programmes of Macao Polytechnic Institute”. Students are not eligible to attend the final examination and re-sit examination, moreover, an “F” will be given as the final grade to students who have less than the stated attendance for the enrolled learning module.

Assessment

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 learning module even if the overall grade is 50% or higher. Also, students will need to take the re-sit examination if they miss the final examination due to unreasonable absence and their maximum final score will be 50.

Students are allowed to take the final examination only if their attendance rate in the practice section of this subject is over 90%.

	Item	Description	Percentage
1.	Laboratory reports	Will be announced in class	10%
2.	Pharmaceutical calculations	In class exercises	20%
3.	Midterm test	Will be announced in class	20%
4.	Final examination	All materials in this semester	50%

Total Percentage: 100%

Teaching Material(s)

Textbook(s)

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

Reference

Reference book(s)

British Pharmacopoeia Commission. (2013) British Pharmacopoeia 2013.

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

A. J. Winfield (2009) Pharmaceutical Practice, 4th Edition. Churchill Livingstone. ISBN: 9780443069062