CHED MEMORANDUM ORDER (CMO) No. 08
Series of 2006

SUBJECT: POLICIES, STANDARDS AND GUIDELINES FOR PHARMACY EDUCATION

In accordance with the pertinent provisions of Republic Act (RA) No. 7723, otherwise known as the “Higher Education Act of 1994,” and for the purpose of rationalizing Pharmacy Education in the country with the goal to view of meeting the health needs of the people through quality health services and keeping it relevant and in tune with the demands of global competitiveness, the following policies and standards for Pharmacy Education are hereby adopted and reenforced by this Commission, thus:

ARTICLE I

INTRODUCTION

Section 1. Pharmacy education is a four-year Bachelor program which provides a broad spectrum of scientific training and prepares its graduates to a wider range of scientific fields principally in higher education, private industry, community drug stores, hospitals, in government agencies, research establishments, public health and pharmaceutical industry. It should also prepare pharmacists for community, hospital, business establishments, drug delivery system, and veterinary medicines.

The main purpose of Pharmacy Education is to provide the country with pharmacists who are scientifically competent to deliver the full spectrum of pharmaceutical services required in health care delivery. After finishing the program, the graduates shall have acquired and developed the knowledge, skills, aptitude, and competencies of:

1. conducting scientific research methods and procedures;
2. developing drugs for prevention, diagnosis, mitigation and treatment of diseases of man and animals;
3. identifying, compounding, manufacturing, storing, and designing drugs;
4. managing drug establishments and on sound entrepreneurial practice.

DAIP Why, San Miguel Avenue, Ortigas Center, Pasig City
5. providing pharmaceutical care as well as counselling clients in the proper use of both prescribed and over-the-counter medications.
6. providing drug and health-related information.
7. advancing professional and ethical pharmacy practice.
8. contributing to the overall social, economic, cultural, and physical health of individuals, communities, and the country.

Article II

AUTHORITY TO OPERATE

Section 2. All private higher education institutions (PHEDs) intending to offer the Bachelor of Science in Pharmacy program must first secure proper authority from the Commission in accordance with existing rules and regulations. State universities and colleges (SUCs) and local colleges and universities should strictly adhere to the provisions in these guidelines.

Article III

PROGRAM SPECIFICATIONS

Section 3. Program Name: Bachelor of Science in Pharmacy

Section 4. Program Description:

Bachelor of Science in Pharmacy is a multi-disciplinary four-year course as mandated by the pharmacy law in accordance with the standards set by general education courses, core courses, and professional pharmacy courses.

(a) Objectives: The U.S. Pharmacy Program aims to prepare its graduates for the following roles:

- Health Care Provider
- Decision Maker
- Researcher
- Leader
- Manager
- Taxayer
- Communicator/Counselor
- Entrepreneur
- Life Long Learner
- Agent of Positive Change

(b) Specify pharmacy practice area when a graduate may work:

1. Drug Safety.
2. Drug Caudibilities:
- Pharmacist, Owner/Manager/Supervisor/Staff
- Regulatory Pharmacist
- Company Pharmacist
- Researcher/Clinical Researcher
- Quality Control Analyst
- Quality Assurance Inspector
- Medical Representative
- Product Manager
- Production Pharmacist
- Production Planning and Inventory Control Officer
- Marketing Specialist

3. Academic Institutions:
- Professor
- Instructor
- Lecturer
- Administrator/Dean/Institute Dean/Program Coordinator/Department Chair

4. Governmental agencies:
- Board Examiner
- Food and Drug Administration (FDA)
- Drug Regulation Office (DOE)
- Director of Bureau of Food and Drugs (BFAD)
- Hospital/Pharmacy
- Researcher
- Consultant
- Pharmer
- Military Pharmacist
- Forensic Pharmacist/Analyst

5. Health Maintenance Organizations (HMOs):
- HMO Pharmacist
- Medical Transcriber
- Health Care Center Pharmacist

6. Research Institutions:
- Researcher
- Administrator
7. Non Government Organizations/Private Corporations
   - Project Director
   - Consultant
   - Company Pharmacist

**Article IV**

**COMPETENCY STANDARDS**

Section 5. The competency standards present the minimum level of competence of pharmacy graduates required in community, hospital and pharmaceutical/technology/regulated practice areas. The standards set will be used as guide and basis for designing the curriculum, formulating question examination question, performance evaluation in the workplace and in monitoring the quality of pharmacy education.

**Article V**

**CURRICULUM**

Section 6. Curriculum Description:

Bachelor of Science in Pharmacy Curriculum consists of courses arranged from First Year to Fourth Year. Each level/year consists of 24 semester units.

The minimum requirements for the Bachelor of Science in Pharmacy curriculum are flexible depending on the needs of the profession and is consistent with the Policies and Standards of CHED.

Section 7. Curriculum Outlines

a) Outline and Total Units of General Education (GE) Courses

<table>
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</tr>
<tr>
<td>English II</td>
<td>3</td>
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<td>Filipino I</td>
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<tr>
<td>Filipino II</td>
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<tr>
<td>Humanities</td>
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</tr>
<tr>
<td>Logic</td>
<td>3</td>
</tr>
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<td>Arts</td>
<td>3</td>
</tr>
<tr>
<td>PH, LR</td>
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</tr>
</tbody>
</table>
Maths/Natural Sciences/Info Tech
- Maths 1: 3 units
- Statistics: 3 units
- Physics: 5 units
- Gen. & Inorg. Chem.: 5 units
- Computer 1: 3 units
- Social Science
  - Health Educ. & Life: 3 units
  - Socio-Auth: 1 unit
  - Health Ethics: 3 units
  - Psychology: 3 units
- Mandated Subjects
  - Eng. Lab, Work & Writings: 3 units
  - Hist. & New Cont.: 3 units
- Physical Education
  - P.E. 1: 2 units
  - P.E. 2: 2 units
  - P.E. 3: 2 units
  - P.E. 4: 2 units
- NSTP
  - NSTP 11: 3 units
  - NSTP 12: 3 units
- TOTAL UNITS: 72 units

b) Outline and Total Units of Core Courses
- PBS 1 (Pharmaceutical Botany with Taxonomy): 5 units
- PBS 2 (Human Anatomy & Physiology with Pathology): 5 units
- Pharm 1 (Introduction to Pharmacy): 3 units
- Curr 2 (Pharmacy Informatics): 3 units
- Pharm Care 1 (General Concept of the Health Care System): 3 units
- Pharm Care 2 (Communication & Professional Skills): 3 units
- English 4 (Technical Writing): 3 units
- TOTAL UNITS: 30 UNITS
c) Outline and total units of Professional Courses

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<td>Phys 3 (Physical Chemistry)</td>
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<td>Physics 2 (Physics of Med 1)</td>
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<td>Physics 3 (Physical Chemistry)</td>
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<td>Physics 4 (Biology &amp; Pharmacology)</td>
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<td>PS 4 (Pharmacology &amp; Drug Chemistry)</td>
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<td>PS 5 (Pharmacology &amp; Pharmacology)</td>
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<tr>
<td>Pharmacy 2 (Pharmacology of Med 2)</td>
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<td>Pharmacology 2 (Pharmacology)</td>
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<td>Thesis 6 (Thesis Writing)</td>
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Session 8: Program of Study

BACHELOR OF SCIENCE IN PHARMACY
Projected Minimum Curriculum Requirement

FIRST YEAR

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SECOND YEAR

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## THIRD YEAR

### 1st Semester

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<td>Pharm. 1</td>
<td>Pharmacy &amp; Chemistry &amp; Medicinals I</td>
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<td>Pharm 3</td>
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<tr>
<td>Pharmacy 4</td>
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| Total     |                                                   | 18   | 6   | 24   |

### 2nd Semester

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<th>Lab</th>
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<tbody>
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<td>Communication &amp; Interpersonal Skills</td>
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| Total     |                                                   | 18   | 7   | 25   |

## FOURTH YEAR

### 1st Semester

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<td>Ph. Bio. Sci 7</td>
<td>Pharmacology &amp; Therapeutics</td>
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<td>Pharm. Chem 4</td>
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<td>Research 3</td>
<td>Pharmacy Research &amp; Thesis Writing</td>
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<td>3</td>
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<td>Pharm. Case 4</td>
<td>Dispensing &amp; Medication Counseling</td>
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<tr>
<td>Pharm. Ad &amp; Mgr 3</td>
<td>Principles of Pharmacy Administration</td>
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<tr>
<td>&amp; Management</td>
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| Total     |                                                   | 16   | 4   | 20    |

### 2nd Semester

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<th>Lect</th>
<th>Lab</th>
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<td>Philippine History and Constitution</td>
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</tbody>
</table>

| Total     |                                                   | 5    | 1   |       |

| Total     |                                                   | 6    |     |       |
Section 9. Thesis/Research Project Requirement

Research & thesis Writing is a 4 unit subject wherein the student should have completed the research requirement and submitted their output.

Section 10. Practicum/Internship Requirement. The student must have completed the number of hours for community, hospital and manufacturing pharmacy practices as an requirement for graduation. The number of hours required for major internship must be completed prior to taking the pharmacy literature examination. The major internship can be done in any of the three areas of internship.

Community Pharmacy: 200 hours
Hospital Pharmacy: 200 hours
Manufacturing Pharmacy: 200 hours
Major Internship: 300 hours

TOTAL NO. OF HOURS: 900 hours

Article VI

COURSE SPECIFICATIONS

Section 11. The following are the course specifications for professional pharmacy courses.

Course Name: Introduction to Pharmacy
(Pharm 1)

Course Description: The course orienting the student in the history and development of pharmacy and the methods of its practice.

Course Objective: At the end of the course, the students should be able to:

1. 3
2. 2
3. 1
1. Trace the evolution of pharmacy practice.
2. Describe the general education and professional courses in the pharmacy curriculum.
3. Source the different types of medicines used in pharmacy.
4. Differentiate the various areas of pharmacy practice.
5. Examine the legal and ethical aspects of the practice of pharmacy.
6. Identify the difference pharmaceutical dispensers and their objectives.
7. Define common medical terms used in the practice of pharmacy.
8. Distinguish the different therapeutic classifications of drugs, dosage forms, and their corresponding routes of administration and their pharmacological actions.
9. Develop an appreciation and understanding of the pharmacist's role and professional responsibilities.

Number of Units: 3 units
Number of Contact Hours: 3 hours lecture per week
Pre-requisites: None

Course Outline:
Unit I: Historical Development of Pharmaceutical Practice
Unit II: Pharmaceutical Education
Unit III: Essentials of Pharmaceutical Literature
Unit IV: Specialties in Pharmacy Practice, Functions, and Responsibilities
Unit V: Legal and Ethical Control in the Practice of Pharmacy
Unit VI: Pharmaceutical Organizations
Unit VII: Common Medical Terms and Abbreviations
Unit VIII: Information to the Compounding Therapeutic Classification of Drugs, Dosage Forms and Their Corresponding Mode of Administration

Text and References:
>
> CHED Policy and Standards on Pharmacy Education
Course Name: Pharmaceutical Calculations

Course Description: This course covers nomenclature and calculations applied in the practice of pharmacy.

Course Objectives:
1. Demonstrate knowledge of the different systems of unit measurement in the pharmacy practice.
2. Identify principles and mechanisms of drug action.
3. Perform mathematical operations used in the practice of pharmacy.
4. Solve problems related to compounding and dispensing of drugs, and
5. Manipulate the values of accuracy, honesty, analytical thinking, scientific discipline, patience and industry.

Number of Units: 3 units

Number of Contact Hours: 1 hour lecture per week

Pre-requisites: Pharmacy I

Course Outline:
Unit I: Weighing and Measurement
Unit II: Prescription and Medication Order Interpretation
Unit III: Solving and Deriving Formulas
Unit IV: Density, Specific Gravity and Specific Volume
Unit V: Methods of Expressing Concentrations
Unit VI: Dilution and Concentration
Unit VII: Dosage Calculations
Unit VIII: Introduction to Pigging

Texts and References:
Course Name: Physical Pharmacy
(Pharmacy 3)

Course Description: This course involves an analysis of application of basic physicochemical principles and methodology in the ability to drug design from drug design, preparation, stabilization and administration, in also relating to the understanding of basic principles to selected therapeutic problems.

Course Objectives: At the end of the course, the student should be able to:
1. Acquire basic knowledge and skills pertinent to drug design.
2. Apply the physicochemical properties of drugs in the design of new formulations.
3. Interpret theoretical principles in terms of common laboratory situations.
4. Analyze and solve accurately problems encountered in drug design.

Number of Units: 4 units (3 hours lecture - 1 hour laboratory)

Number of course hours: 3 hours lecture and 1 hour lab per week

Prerequisites: Physiology, Organic Chemistry, Pharmacology I

Course Outline:
I. Introduction to the Course
II. Stability and distribution phenomena
III. Clinical
IV. Course Requirements
V. Buffer systems and isoelectric solution
VI. Biocatalytic phenomena
VII. Microwave techniques
VIII. Rheology and Biochemistry
IX. Comprehensive and Protein-binding application to the practice of Pharmacy
X. Kinetics and its significance to the manufacturers, physicians, pharmacists and patients

Laboratory Equipment: See Annex B (List of Laboratory Equipment, Facilities and Supplies)

Tests and References:
- Axell, Robert, Introduction to Pharmaceutical Dosage Forms, 4th Ed. (Latest)

Course Name: Biopharmaceutics and Pharmacokinetics (Pharm 4)

Course Description: This course deals with the basic principles and factors affecting drug liberation, absorption, distribution, metabolism and excretion, including the appropriate mathematical models that describe drug behavior in the body in both normal and altered physiologic states which are necessary for the design of rational dosage regimens.

Course Objectives:
At the end of the course, the students should be able to:
1. Discuss the principles of liberation, absorption, distribution, metabolism and excretion, and the factors that affect these processes.
2. Define relevant pharmacokinetic terminology.
3. Use raw data and derive pharmacokinetic models and parameters that best describe the pharmacokinetic behavior of drugs in the body.
4. Describe how changes in the physiologic state, including disease states affect drug behavior.
5. Apply knowledge of biopharmaceutics and pharmacokinetics in the design of a rational drug therapy and monitoring, (dosing regimen)

13
Course Name: Hospital Pharmacy
(Phase I)

Course Description: An introductory course in the practice of pharmacy in a hospital setting. It includes the theoretical structures of the pharmacy department and its relation to other departments. It covers the different drug distribution systems, bulk compounding methods, parenteral administration, practice protocols, pharmacy and therapeutics committees and general pharmacy administration.

Course Objectives: At the end of the course, the students should be able to:
1. State and explain the minimum standard for pharmacy in hospitals and the different components required of hospital pharmacists.
2. Appreciate the role of pharmacist in delivery of quality patient care;
3. Classify and evaluate the different drug distribution systems; and
4. Identify and experience the various aspects of institutional pharmacy.

Number of Units: 3 units (2 units lecture, 1 unit laboratory)
Number of Contact Hours: 2 lecture hours and 3 laboratory hours per week.

Prerequisites:
Physical Pharmacy and Drug Delivery System

Course Outline:
Unit I: Introduction to Hospital Pharmacy
Unit II: Hospital and Its Organization
Unit III: The Hospital Pharmacy Department
Unit IV: The Pharmacy and the Hospital Environment
Unit V: Hospital Formulary
Unit VI: Management and Control
Unit VII: Drug Distribution Systems
Unit VIII: Distribution and Preparation of Oral Products
Unit IX: Education and Training Program
Unit X: Patient-Centered Services
Unit XI: Legal Aspects of Institutions Practice

Laboratory Equipment:
Dry laboratory Overhead Projector, Transparency, Video Projector, LCD

Text and References:
Course Name: Pharmaceutical Botany with Taxonomy
(Pharm. Bio. 706, 1)

Course Description: The course is an advanced preparation of plant life and related living forms, inclusive of classification, structure, and hierarchical organization and is an integral part of the星期tissue and the pharmaceutical field.

Course Objectives: At the end of the course, the students should be able to:
1. Acquire the knowledge of classification, development, and morphology of plants
2. Appreciate the significance of giving to the environment a fine essence
3. Appreciate the importance of Botany in pharmacy and other related fields

Number of Units: 7 units (Lecture 3 units, Laboratory 2 units)
Number of contact hours: Lecture 3 hours/week, Laboratory 2 hours/week
Pre-requisites: None

Course Outline:
1. Introduction to Plant Science
2. Introduction to the Principles of Chemistry and Its Applications to Plants
3. Cell Structure, Development, and Function
4. Plant Tissues and Development
5. Morphological and Development of Roots, Fruits, and Integuments
6. Ecological Genetics, Metaphor, and Sexual Physiology and Reproduction
7. Genus Morphology
8. Energy Production: Photosynthesis
9. Effects of Light on the Growth and Function
10. Plant Development and Morphogenesis
11. Ecology: Populations and Ecosystems
12. Types of Biomes
13. Introduction to Heredity
14. Four components of Heritage
15. Major Plant Taxonomists and their contribution
16. General Structure of Bacteria
17. Taxonomic grouping of Eubacteria with planktonic unicellular algae
18. Taxonomic grouping of Archaeobacteria
19. Kingdom Plants
20. Kingdom Fungi
21. Kingdom Protists
Laboratory Equipment: 
- See Annex B (List of Laboratory Equipment, Sanitizers and Supplies)

Text and References:

Course Name: 
**Pharmacological Biochemistry**
(Pharm. Bio, Lab 3)

Course Description: 
The course deals with the molecular hierarchy of the living cell. It covers the study of the biochemical carbohydrates, proteins, lipids and nucleic acids in relation to their structure and function in the living system. The generation and usage of metabolic energy, biosynthesis of biochemicals and the transmission and expression of genetic information is also discussed. It has importance and correlation to health and disease.

Course Objectives: 
1. The end of the course, the students should be able to:
   1. List the major categories of the different biochemicals: carbohydrates, proteins, lipids, and nucleic acids.
   2. Understand basic concepts and principles of the synthesis of biochemicals.
   3. Apply the methods and techniques in the isolation, characterization, and analysis of different biochemicals.
   4. Correlate structure with the biological function of the biochemicals.
   5. Understand the importance of transmission and expression of genetic information.
6. Describe the pathways that lead to the generation and storage of metabolic fuel.
7. Explain the progression of metabolic disorders in relation to health and disease.
8. Apply principles of biochemistry to pharmacy, genetics, biotechnology and other related fields.

Number of Units: 5 units (2.0 units lecture and 3.0 units laboratory)
Number of contact hours: 3 hours lecture, 6 hours laboratory per week.

Prerequisites: Organic Chemistry, Anatomy and Physiology with Pathophysiology

Course Outline:
- Unit 1: Introduction to Biochemistry
- Unit 2: Proteins
- Unit 3: Enzymes
- Unit 4: Nucleic Acids
- Unit 5: Carbohydrates
- Unit 6: Lipids
- Unit 7: Generation and Storage of Metabolic Energy

Texts and References:

Course Name: Pharmacognosy and Plant Chemistry
(Pharm. Bio. Sci. 4)

Course Description: The course deals with the study of the classification, botanical and chemical properties, pharmacological and pharmaceutical uses of natural drugs (including Philippine medicinal plants). It also covers the biosynthesis, extraction, isolation, purification and
Course Objectives:

At the end of the course, the student should be able to:

1. Understand the concepts and principles of Pharmacognosy and Plant Chemistry.
2. Acquire knowledge and skills in classifying and evaluating natural drugs.
3. Recognize the various plant constituents of importance in Pharmacology and Medicinal.
4. Understand the different biosynthetic pathways of plant metabolites.
5. Comprehend the principles of biotechnology in the context.
6. Perform activities applying the laboratory techniques for isolation and characterization of various medicinal plants.
7. Appreciate the pharmacists' social and professional responsibilities to patients and patients' health of men and animals.
8. Uphold the ethical and ethical standards expected of a Pharmacy profession.

Number of Units:
3 units lecture, 2 units laboratory

Number of contact hours:
Lectures 3 hours/week, Laboratory 6 hours/week

Prerequisites:
Pharmacognosy, Toxicology, Organic Chemistry, and Pharmaceutical Biochemistry

Course Outline:

I. Introduction
II. Carbohydrates
1. Biosynthesis of Carbohydrates
2. Classification of Carbohydrates and Drugs
   a. Oligosaccharides
   b. Polysaccharides
3. Elaboration and Purification
4. Uses of Carbohydrates
5. Sources and Uses of Carbohydrates

III. Glycosides
1. Biosynthesis of Glycosides
2. Classes of Glycosides
3. Extraction and Purification
4. Tests for Glycosides
5. Sources and Uses of Glycosides

IV. Terpenes
1. Biosynthesis of Terpenes
2. Classes of Terpenes
3. Formation and Purification

Page 19
4. Tentorii Tannins
5. Sources and Uses of Tannins

V. Lipids
1. Biochemistry of Lipids
2. Classes of Lipids
3. Extraction and Purification
4. Tests for Lipids
5. Sources and Uses of Lipids

VI. Vegetable Oils
1. Biochemistry of Vegetable oils
2. Classes of Vegetable Oils
3. Extraction and Purification
4. Tests for Vegetable Oils
5. Sources and Uses of Vegetable oils

VII. Resins, Rosin and Colophony

IX. Alkaloids
1. Biosynthesis of Alkaloids
2. Classes of Alkaloids
3. Extraction and Purification
4. Tests for Alkaloids
5. Sources and Uses of Alkaloids

IX. Endocrine Products
1. Classes of Hormones
2. Regulation in the Production of Hormones
3. Sources and Uses of Hormones
4. Conditions, Symptoms and Treatment of
5. Biotechnology in Commercial Hormone Production

X. Enzymes and other Proteins
1. Classification and Properties of Enzymes
2. Sources and Uses of Enzymes

XI. Vitamins and Vitamers - Antivitamin Drugs
1. Classes of Vitamins
2. Biosynthesis of Vitamins
3. Sources and Uses of Vitamins (Including
Minerals)

XII. Antibiotics
1. Classes of Antibiotics
2. Sources of Antibiotics

XIII. Biologica
Course Name: Pharmaceutical Microbiology and Parasitology
(Pharm. Bio. Sci. 5)

Course Description: The course deals with microorganisms, particularly those pathogens to man, and the parasitic helminths of man— their biology, the infections they cause, host response to these infections, and their modes of transmission, prevention and treatment. The course provides laboratory experience in studying microorganisms and parasitic helminths, and in utilizing ascentic techniques for microscopic control. It also discusses microbiological aspects of the pharmaceutical industry. Special attention is given to identification and distribution, antiviruses and chemotherapy agents.

Course Objectives: At the end of the course, the students should be able to:
1. Differentiate the various groups of microorganisms identify the events and people involved in the development of microbiology, describe the basic laboratory equipment and procedures in the study.
of microorganisms, and discuss the biology of microorganisms.
2. Appreciate the importance of microorganisms in
medical research.
3. Understand the importance of aseptic techniques
both in laboratory and hospital settings.
4. Be familiar with the Microbiological Safety
Guidelines (GMP) guidelines in
controlling microbial contamination during drug
manufacture.
5. Examine the techniques for the control of
pathogenic microorganisms and the use of
antimicrobial agents in therapy.
6. Define infectious and infectious diseases
characteristic symptoms, and specific diseases
the human body uses to recognize the
to the invasion of disease organisms, and evaluate the application of
the principles of immunology assists the
elimination of disease.
7. Accept the significance roles of microorganisms,
including diseases in the development of diseases
multiple preventive and therapeutic measures.
8. Evaluate the role of microorganisms in food
protection and preservation.
Discuss the major diseases of man caused by
pathogenic microorganisms and parasitic helminths.
Diseases, epidemiology, control, immunology and
treatment.

Number of Units: 5 units (3 units lecture / 2 units laboratory)
Number of contact hours: Lecture (3 hours per week) Laboratory (6 hours per week)

Prerequisites: Human Anatomy and Physiology with
Pharmacology and Pharmaceutical Biotechnology

Course Outline:
1. Fundamentals of Microbiology
   A. Introduction to Microbiology
   B. Biotypes and Pathogenicity
   C. Characteristics of Microorganisms
2. Microbiology and Pathogenicity
   A. Characteristics of Microorganisms
   B. Characteristics of Pathogenicity
3. Evaluation of Biochemical Characteristics
4. Control of Microbial Growth
5. Pathogenesis and Pathogenesis on Pathogen Control
6. Host-Parasite Relationship
7. Antimicrobial Drugs
8. Microorganisms of Human Diseases
9. Immunology
A. Introduction
B. Nomenclature and Classification of Plants
C. Phylogenetic
D. Phylogenetic Relationships
E. Class Cycads
F. Uroch Diosmena

Laboratory Equipment: See section B: List of Laboratory Equipment, Facilities and Supplies

Texts and References:
- Tuxen, Faksim, Microbiology, 6th Ed. 1993
- Tuxen, Faksim, et al. Microbiology, 7th Ed. 2002
- Jensen, E. et al. Medical Microbiology, 23rd Ed. 2002
- Roberts, Jerry. Foundations of Pathology, 2000

Course Title: Pharmacology I
(Pharm. Sci. 601)

Course Description:
The course deals with the study of drugs and their biochemical and physiological effects, mechanisms of action, pharmacodynamic properties, therapeutic uses, adverse reactions, toxicological effects, and interactions.

Course Number: 601

Course Objectives:
At the end of the course, the students should be able to:
1. Classify drugs according to their therapeutic and biochemical categories
2. Describe the pharmacodynamic, pharmacokinetic, and toxicological properties of drugs used in various disease conditions
3. Integrate knowledge on the pharmacodynamic, pharmacokinetic, and toxicological properties of drugs as they relate to the pharmacotherapy of the disease conditions to which the drugs are used
4. Discuss the rational use of drugs in the management of specific diseases according to current therapeutic guidelines, recommendations, and clinical trials
5. Develop attitudes and current trends in research

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on drugs and their therapeutic applications

Number of Units: 4 units (6 units lecture)

Number of Contact Hours: 4 hours lecture/week

Prerequisites: Human Anatomy, Physiology & Pathophysiology, Pharmacological Chemistry (Units 1 & 7, Chemistry Affinity and Pharmacology prerequisite)

Course Outline:

I. General Principles of Pharmacology
   A. Introduction
   B. Review of Pharmacokinetic Principles
   C. Pharmacodynamic Principles
   1. Molecular mechanisms of drug action
   2. Dose/Bioavailability relationship
   3. Concepts of agonism, antagonism, allosteric modulation

II. Pharmacotherapeutic Principles

   A. Aqueous Solution
   B. Lipid Emulsions
   C. Protein Precipitation and Emulsification
   D. Keto-Appleton process

III. Pharmacology of the Autonomic Nervous System Drugs
   A. Physiology of the Autonomic Nervous System
   B. Drug Action of the ANS
   C. Pharmacology of CNS drugs and drugs for pain management
      1. Psychotropic Drugs a. Psychotic and the Antipsychotic agents
         b. Mood disorders and the anti-depressants and mood stabilizers
      2. Anxiety disorders, Anti-anxiety agents, antihypertensives
      3. Neurochemical action in psychopharmacology
      4. Dopaminergic agents
      5. Anticholinergic agents
      6. Enzyme inhibitors: MAO and COMT
   D. Muscular system drugs
   E. Central and local anesthetics
   F. Antimicrobial and agents
      1. Antimicrobial
      2. Antihistaminic
Texts and References:


Course Name: Pharmacology 2 and Therapeutics (Pharm. Sci. Unit 2)

Course Description:

This course, a continuation of Pharmacology 1, deals with the pharmacodynamic, pharmacochemical, toxicokinetics and therapeutic properties of drugs used in the management of cardiovascular, respiratory, gastrointestinal, endocrine, metabolic, CNS, immunological, oncologic, and infectious conditions.

Course Objectives:

At the end of the course, the students should be able to:

a. Describe the pharmacodynamic, pharmacochemical, and toxicokinetic properties of drugs used in various disease conditions.

b. Integrate knowledge in the pharmacology unit.
and pharmacokinetic properties of drugs as they relate to the pathogenesis of the disease condition for which the drugs are used.

- Discuss rational use of drugs in the management of specific disease conditions.
- Design procedures to test pharmacologic and physiologic activities of common drug classes using guided models.

Number of units: 4 units (2 in lecture, 1 in laboratory)
Number of contact hours: 3 hours lecture and 3 hours laboratory per week
Prerequisites: Pharmacology 1

Course Outline:

I. Cardiovascular Drugs
   A. Diuretics and Cardiovascular Drugs
   B. Antihypertensive drugs
   C. Pharmacologic approaches to arrest failure
   D. Carotid sinus and drugs with baroreceptor effect
   E. Miscellaneous agents: adrenergic, magnesium
II. Respiratory Drugs
   A. Drugs used for bronchial asthma and COPD
   B. Cough and mucus production: Expectorants, Antihistamines
III. Gastrointestinal Drugs
   A. Pharmacology of Acid Peptic Disorders
   B. Drugs affecting gastrointestinal motility and secretion

IV. Hormonal Agents
   A. Hypothalamic and Pituitary Hormones and Antagonists
   1. Physiology of hypothalamic-pituitary control of target organ hormone secretion
   2. Specific hypothalamic-pituitary hormones and antagonists
   3. Gonadal hormones and other reproductive drugs
   4. Pharmacology of thyroid disorders
   5. Adrenocortical hormones
   6. Insulin and drugs for diabetes mellitus

V. Drugs for Metabolic and Congenital Disorders
Hyperlipidemia, Atherosclerosis, Thrombosis, Bleeding
I. Diagnosis Hypertension
A. Drugs for Hypertension
B. Drugs for Congestive Heart Failure: Anti-Coagulants, Prostaglandins
C. Vasosuppressors and Hypotensive Agents (dibennamine, hydralazine, nitroglycerin, ACE inhibitors)

VII. Drugs that Affect Immune Function: Allergy, Rhinocerebral Arteritis and Vasculitis, Mycoplasma Pneumoniae Immunomodulation Therapy
A. Interleukins
B. Interferons and Interferon-Antagonistic Agents
C. Monoclonal Antibodies

VIII. Intravascular Vascular Conditions, Endothelial Dysfunction, Cancer
A. Anticancer Agents: Antimetabolites, Topoisomerase Inhibitors, Anthracyclines, Vinca Alkaloids, Taxanes, Monoclonal Antibodies, Cytokines, Chemotherapy, Radiation Therapy
B. Autologous and Allogeneic Bone Marrow Transplantation
C. Antineoplastics
D. Antiprotozoals
E. Antitumor Agents
F. Cancer Chemotherapeutic Agents

VIII. Anesthesia Pharmacology

Laboratory Equipment:
- See Annex 1 (List of Laboratory Equipment, Facilities and Supplies)

Tests and Reference Texts:
- Koren, R.G., Drug and Clinical Pharmacology
- Murad, J.G. and Landaw, L.S., Goodman and Gilman’s The Pharmacological Basis of Therapeutics

Course Notes:
- General Principles of Health Care (Pharm Core 1)

Course Description:
- The course studies, with the holistic approach in the prevention of health. It includes discussion on the human life cycle, health problem identification, health care strategies, essential health interventions, and health policies that support health-related issues and policies.
Course Objectives:
1. Understand the dynamics of health in the context of different interacting dimensions leading to total health.
2. Characterize the human life cycle and determine variances among the stages in physical, physiological, and psycho-social development.
3. Identify the sources of arising health problems and to describe basic assessment tools in providing patient care.
4. Illustrate optimal health through general disease management, health strategies and interventions.
5. Introduce different health-support actors in private and public practice, including different professions responsible in providing health care in the community.

Number of Units: 3 units
Number of contact hours: 3 hours lecture per week
Pre-requisites: None

Course Outline:
Unit I: Health Care Process
A. Definition
B. Principles

Unit II: Dimensions of Health
A. Physical Health
B. Functional Health
C. Socialized Health
D. Spiritual Health
E. Social Health
F. Occupational Health

Unit III: Stage and Needs of Human Life
A. Infants
B. Children
C. Adolescents
D. Adults
E. Elderly

Unit IV: Wellness and Illness
A. Maslow’s Hierarchy of Needs
B. Health Status Indicator
C. Causes of Illness
D. Introduction to Assessment
E. Vital Signs
F. Diagnostic/Screening Tests

Unit V: Health Care Strategies
Course Name: Public Health (Pharm Core 2)

Course Description: This course will introduce the student to community health which includes both the private and public (government) efforts of individuals, groups, and organizations to promote, protect, and preserve the health of those in the community.

Course Objectives:

1. Describe basic principles of disease prevention methods.
2. Identify and describe the structure and function of government and non-government health organizations at the international, national, and local levels.
3. Understand infectious diseases and their impact on the community.
4. Explain the relationship of environment to health.
5. Correlate health to sustainable natural development.
Number of Units: 7
Number of contact hours: 3

Prerequisites:
- Microbiology and Parasitology
- Pharmacology Core I

Course Outline:

Unit 1: Public Health Concepts
  A. Definition of Health
  B. Public Health Concepts

Unit 2: Factors that Affect Health
  A. Individual
    i. Non-defence Mechanisms
  B. Communal
    i. Environmental Pollutants
      a. Water
      b. Air
      c. Soil
  C. Environmental Sanitation
    a. Water Sanitation
    b. Housing Sanitation
    c. Food and Milk Sanitation
    d. Control of Air Pollution
    e. Insect and Rodent Control
    f. Sewage Disposal

Unit 3: Etiology of Disease
  A. Factors in Disease Causation
  B. The Natural History of Disease
  C. Etiologic Concept of Disease
  D. Agents of Infectious Disease
  E. Sources of Infection and Disease in Community

F. Means of Transmission
G. Measures of Disease Control
H. Epidemiologic Methods
I. Investigation of Outbreaks

Unit 4: Disease Prevention and Control
  A. Techniques
  B. Levels of Prevention

Unit 5: Health Promotion in Industry
  A. Objectives of Occupational Health
  B. Legal Control of Occupational Health Services

Unit 6: Government and Non-government Health Programs and Services
  A. Central
  B. National
  C. International

Unit 7: Infectious Diseases in the Philippines
A. Water / Food borne Diseases
1. Typhoid Fever
2. Hepatitis A
3. Cholera
4. Acute dysentery
5. Escol amoebic dysentery
6. Facillary dysentery

B. Sexually Transmitted Diseases
1. Syphilis
2. AIDS
3. Neisseria gonorrhoeae
4. Human Papilloma virus
5. Gonorrhea
6. Herpes

C. Arthritis Diseases/Inflammation
1. Psoriasis
2. Chickenpox
3. Measles
4. SARS
5. Psoriasis
6. Chickenpox
7. Mumps
8. Vector borne Disease
9. Dengue fever
10. Malaria
11. Zoonotic
12. Rickets
13. Anthrax
14. Foot and Mouth disease
15. Bird Flu
16. Moll uskew Disease
17. Others
18. Leprosy

Laboratory Equipment: See Annex B - List of Laboratory Equipment, Facilities and Supplies

References:
Course Name: Interpersonal Communications Skills for Pharmacists (Pharm Comm 1)

Course Description:
This course deals with the study of basic concepts of interpersonal relationships and effective communication. It covers a variety of areas of learning interpersonal communication and developing skills needed by pharmacists to meet the responsibilities of a patient-centered pharmaceutical care environment.

Course Objectives:
At the end of the course, the student should be able to:
1. Define the various assumptions, beliefs, concepts, and theoretical perspectives and contemporary issues surrounding the professional pharmacist-patient relationship.
2. Demonstrate the communication process.
3. Demonstrate effective listening, writing, and speaking skills with special attention to the application of these to various interactions and relationships with other health care professionals.
4. Define and describe the characteristics of therapeutic communication.
5. Identify the purposes of therapeutic communication.
6. Demonstrate the ability to establish patient relationships that create a "partnership" with patients in helping them reach their therapeutic goals, and
7. Apply assertive communication skills needed when pharmacists become active role in patient care.

Number of Units: 3 units

Number of Contact Hours: 3 hours lecture per week

Prerequisites: English, 1 and 2, General Psychology, Philosophy of Man

Course Outline:
Unit 1: Basic Concepts - Theoretical Perspectives and Contemporary Issues Surrounding the Professional Pharmacist-Patient Relationship
1. Maslow’s Hierarchy of Needs
2. Erikson’s Stages of Development / Crisis Stages of Development / Stages of Transition within the Framework of Stages of Lifespan Development

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I. Personal Development
J. Conflict Resolution
K. Developing Gender Roles

II. The Model of Interpersonal Relationships
A. Interaction
B. Inquiry
C. Direct Influence
D. Strategic Influence

III. Basic Assumptions of Communication/Communication Process
A. Principles and Elements of Interpersonal Communication
B. Communication Styles: Meta Communication, Verbal Communication, Nonverbal Communication
C. Conditions for Effective Communication in Pharmacy
D. Communication Review
F. Developing Communication Behavior

IV. Developing Therapeutic Communication Skills in Pharmacy/Clinical Relationship
A. Purpose of Therapeutic Communication
B. Active Listening Techniques
C. Applications
  - Assessment/Orientation: Building Rapport, Observation
  - Asking Questions: Open-ended, Close-ended, Circular Questions, Follow-up Questions
  - What Is Therapeutic Listening to: Communication Patterns, Intimate Communication, Therapeutic Listening Responses
V. Verbal Responses

VI. Physical Skills for Pharmacists
A. Assessment, Theoretical Foundation and Testing
B. Counseling in Special Patients
C. Counseling with Children and Elders About Medications

References
Course Name: Dispensing and Medication Counseling (PharmCare 4)

Course Description:
This course deals with the basic concepts of dispensing, dispensing techniques, and the ethical scenarios that govern this important facet of the professional practice of pharmacy. It also deals with the study of theoretical principles and contemporary issues relevant to social and behavioral aspects concerning therapeutic medication counseling. Furthermore, this course provides opportunities for experiential learning of the techniques and skills of patient medication counseling role of pharmacists.

Course Objectives:
At the end of the course, the students should be able to:
1. Discuss relevant concepts/principles of social and behavioral sciences and how these concepts apply to practice of pharmacy, specifically dispensing and patient counseling.
2. Demonstrate the ability to follow good dispensing practices.
3. Read and recognize consequences/utility of provisions as mandated by the General Law.
4. Demonstrate safe manipulative skills when using dispensing equipment and correct dispensing procedures.
5. Demonstrate a systematic work behavior and positive attitude.
6. Discuss basic principles of patient medication counseling.
7. Demonstrate proper attitude and skills when...
Course Outline

Unit I - Introduction: Theoretical Perspectives and Contemporary Issues on Dispensing and Patient Medication Counseling
A. Recent Developments in Services Being Provided by Pharmacists
   > Contributions of Pharmacy to Today's Health Care Provision
   > Health Promotion and Health Education, A Review of Pharmacist's Roles
B. Social and Behavioral Aspects of Pharmacy
   > Relationship Between Social Inequalities and Health
   > Personality, Motivation, Empowerment and Compliance
   > Stress, Stress and Coping Mechanisms
   > The Cycle of Change: How to「Brighl」About in Pharmacy Services
C. Pharmaceutical and Medical Interface
   > The Medical and Pharmaceutical Professional
   > The Primary Health Team
   > Inter-professional Relations within the Health Team
D. Critical Thinking, Characteristics of Critical Thinker

Unit II - Dispensing
A. Dispensing Concepts and Laws
B. Dispensing: The Process
   > The Prescription
   > Obtaining Dispensing Requirements as Provided by the Geriatric Law
B. Dispensing Techniques
   > Processing of Prescriptions
   > Discussing Different Drug Delivery Systems
C. Principles of Quality Assurance
Unit III - Patient Counseling
A. Basic Concepts / Principles of Therapeutic Counseling
   ➤ Understanding the Counseling Perspective
   ➤ The Pharmacy-Client Therapeutic Relationship
   ➤ Bridges and Barriers in the Therapeutic Relationship
   ➤ Defining Direct Counseling
   ➤ Understanding Patient's Needs, Wishes and Preferences
B. Minor/Minor Counseling Session
   ➤ Preparing for the Counseling Session
   ➤ The Counseling Process
   ➤ Non-pharmacologic Drug Counseling
C. Educational Methods and Counseling Aids
   ➤ Educational Methods
   ➤ Stages of Learning
   ➤ Counseling Aids
   ➤ Developing an Individual Patient Education Program
   ➤ Evaluation of Patient Education Materials
D. Communication Skills in Patient Counseling
   ➤ Communication as a Counseling Challenge
   ➤ Transactional Analysis Theory
   ➤ Counseling Skills
E. Tailoring Counseling
   ➤ Factors to be Considered in Tailored Counseling
   ➤ Tailoring Counseling to Overcome Difficulties
   ➤ Stages (Preventive Healthcare) Counseling Developing
F. Optimal Counseling Envelope
   ➤ Barriers to Effective Patient Counseling
   ➤ The 4Ps for Effective and Efficient Patient Counseling
   ➤ Self Development of the Counseling Pharmacist

Equipment

Simulated Counseling Area
Course Name: Clinical Pharmacy (Pharm Care 3)

Course Description: This course defines the role of pharmacists in drug therapy, which includes P.D.I.M.E., C.S.I.E. and F.A.B.A.

Course Objectives: At the end of the course, the students should be able to:
1. Provide knowledge and develop basic skills necessary to participate in the identification, evaluation and selection of drug therapy problems in practice.
2. Develop the skill in the critical appraisal of information on the selection of drug therapy problems in practice.
3. Equip students in situations that will require their participation in the patient care plan.
4. Provide experience in integrating and applying pharmaceutical, biochemical and clinical knowledge to patient care and
5. Apply interpersonal skills relevant to clinical
Number of Units: 4 units (3 units lecture and 1 unit laboratory)
Number of contact hours: 3 hours lecture and 3 hours laboratory per week
Pre-requisites: Hospital Pharmacy and Pharmaceutical Care

Course Outline:
1. Introduction and Overview of the Course
   A. Definition and scope of clinical pharmacy
   B. Brief history and current status of clinical pharmacy
2. Complementary and Therapeutic Medicine and Therapeutic Guidelines
3. Complementary and Alternative Interventions
4. Physical Assessment Skills and Interpretation of Laboratory and Diagnostic Test Results
5. Therapeutic Planning and Patient Counseling
6. Monitoring and Reporting of Adverse Drug Reactions and Drug Interactions
7. Drug Use Review
8. Monitoring and Reporting of Medication Errors, and Pharmacovigilance
9. Drug Adjustment
10. Pharmacokinetics- Considerations for the Individual

Tests and References:
Course Name: Drug Delivery Systems (Pharmacy 4)

Course Description: This course deals with the basic pharmacokinetic principles and technologies applied in the preparation of pharmaceutical dosage forms and drug delivery systems.

Course Objectives: At the end of the course, the students should be able to:
1. Acquire and apply the knowledge and skills pertinent to the basic principles, processes, methods, and techniques in the delivery of drugs that have been developed and standardized for use in modern healthcare.
2. Appreciate the social and professional responsibilities of pharmacists in ensuring and maintaining high moral and ethical standards required in the preparation of different pharmaceutical dosage forms and drug delivery systems.

Number of Units: 5 units (3 units lecture, 2 units laboratory)

Number of contact hours: 3 hours lecture, 6 hours laboratory per week

Prerequisites: Pharmaceutical Calculations (Pharmacy 2)

Course Outline:
A. Principles of Dosage Form Design and Development
   1. Classification of Pharmaceutical Preparations
   2. Solid Dosage Forms and Modified-Release Drug Delivery Systems
   B. Solid-liquid Dosage Forms, Pharmaceutical Preparations, and Transdermal Systems
   C. Liquid Dosage Forms
   D. Inhalation Dosage Forms and Delivery Systems
   E. Novel and Advanced Dosage Forms

Laboratory Equipment: See Annex B (Use of Laboratory Equipment, Facilities, and Supplies)

Texts and References:
2. Genicco, Alfredo. Pharmacia’s Pharmacological 39
Course Name: Manufacturing Pharmacy
(Pharmaceutics 2)

Course Description: This course presents the basic principles, methods and technology involved in the production of various drug dosage forms and delivery systems, from the initial design of the dosage forms to their actual manufacture, including the requirements for packaging, equipment and facilities.

Course Objectives: At the end of the course, the students should be able to:
1. Examine and discuss the requirements for facilities, equipment, methods and processes, organization and personnel as specified in the Current Good Manufacturing Practices (CGMPs).
2. Describe the terminology and technology involved in the design, formulation, manufacture and packaging of the various drug dosage forms and delivery systems.
3. Discuss how various ingredients, technological procedures, and material physical and chemical properties affect the formulation, design and production of the various drug dosage forms.

Number of Units: 5 units (3 units lecture, 2 units laboratory)

Number of Contact Hours: 1 hour lecture, 6 hours laboratory per week

Prerequisites: Pharmacology I and Physical Pharmacy

Course Outline:

A. Organizational structure of a pharmaceutical company
B. Current Good Manufacturing Practices (CGMPs)
C. Preformulation Process
   - General pharmacological plane design and construction, non-sterilization-based or air-sterilized (dry, high-temperature and dehumidification), and industrial hazards and safety
   - Material handling systems for solids, liquids and gas
C. Pharmaceutical unit operations and equipment
   - Milling, granulation and size separation, mixing, filtration, drying
D. Facilities, materials, methods and technology in the
design, formulation and production of various dosage forms:

a. Solid dosage forms:

b. Non-sterile liquid dosage forms:

c. Sterile-liquid dosage forms and other topical products

E. Cosmetics

According to the document, the recommended laboratory equipment and facilities include:

Tests and Reference:

- Arent, L., Allen Jr., N. Propocich, Pharmaceutical Dosage Forms and Drug Delivery Systems
- USP’s Good Manufacturing Practice and Inspection
- Walas and P.J. Walker, Handbook of Pharmaceutical Encyclopaedia
- Gennies, Remington: the Science and Practice of Pharmacy, Latest Edition
- T. J. Tanna, Solid Dosage Form, 4th Edition
- Lambert et al., The Theory and Practice of Industrial Pharmacy, 3rd Edition

Course Name:

Chemistry and Pharmacology of Medicinals I

(Pharm. Chem. I)

Course Description:

The course covers the chemistry and pharmacology of inorganic and organic medicinal, with emphasis on those official in the USP and NF. The course covers preparative, properties, tests and uses. It includes the concepts and chemical reactions related to qualitative analysis of inorganic compounds. This also includes the study of structure and physical-chemical properties in relation to biological activity, preparation and synthesis, uses and uses of organic medicinals.

Course Objectives:

At the end of the course, the students should be able to:

1. Apply the knowledge, skills, principles of inorganic chemistry to medicinal and pharmaceutical chemistry.
2. Discuss the official inorganic substances used as therapeutic and diagnostic agents.
3. Manifest an appreciation of the pharmacist’s social and professional responsibilities in maintaining or restoring the health of sick and animals.
4. Coordinate the structure of the drug with its pharmacological, toxicological activity and metabolism.
5. Understand the high moral and ethical standards of the pharmacy profession.

Number of Units: 5 (3 units lecture, 2 units laboratory)
Number of contact hours: (3 hours lecture, 6 hours lab / week)
Pre-requisites:
- Chemistry I (General & Inorganic Chemistry)
- Pharmacy 1 (Introduction to Pharmacy)
Course Outline:
- Unit I: Kinetics and Chemical Quantitation
- Unit II: Group Properties of Elements (including qualitative tests for brasil)
- Unit III: Pharmaceutical Aids and Nomenclature
- Unit IV: Major Tissue and Body-Cellular Electrolytes
- Unit V: Essential, Non-essential and Trace Ion
- Unit VI: Gastrointestinal Agents
- Unit VII: Topical Agents
- Unit VIII: Dental Products
- Unit IX: Minor Therapeutics Pharmaceutical Agents
- Unit X: Inorganic Pharmaceutical Engineering
- Unit XI: Radiopharmaceuticals and Control of Drug
- Unit XII: Introduction to Organic Pharmaceutical Chemistry

Unit XIII: Physical-chemical properties in relation to biological actions

Laboratory Equipment:
- See Annex B (List of Laboratory Equipment, Facilities and Supplies)
Text and References:
Course Name: Chemistry and Pharmacology of Medicinals II
(Pharm. Chem. 2)

Course Description: This is a continuation of Medicinal I, with a
emphasis on the study of inorganic, pharmacological properties of
inorganic compounds in relation to biological activity, preparation
and analysis, and drugs and poisons of organic compounds.

Course Objectives:
1. Describe the metabolic pathway of selected drugs.
2. The importance of the presence in drug research and
development.
3. Understand the molecular quantification in
structure and its role in the biological activity and pharmacological
profile of the drug.
4. Understand the high standard (at ethical standards) of
the pharmaceutical profession.

Number of Units: 4
Number of contact hours: 3 hours lecture, 1 hour laboratory
Pre-requisites: Pharmaceutical Biochemistry

Course Outline:
I. Biodynamic Changes of Drugs and related
Organic Compounds
1. General properties of ionic compounds
2. Some of drug biotransformation

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3. Factors affecting drug metabolism

[Text continues...]

Laboratory Equipment

See Appendix B (List of Laboratory Equipment, Factions and Supplies)

Texts and References

Course Name: Quality Control I - Drug Testing and Assay
(Pharm. Chem. 3)

Course Description: This course deals with the important theories, principles, techniques and applications of various quantitative pharmaceutical analysis, as applied to the quality control of raw materials and drug products.

Course Objectives: At the end of the course, the students should be able to:
1. Apply the principles of quantitative analysis in the analysis of raw materials and drug products.
2. Perform basic calculations involved in pharmaceutical quantitative analysis.
3. Integrate the results of analysis as to conformance to standards and specifications.
4. Interpret the values of accuracy, precision and integrity.

Number of Units: 5 units (3 units lecture, 2 units laboratory)

Number of contact hours: 3 hours lecture and 6 hours laboratory

Prerequisite: Pharmaceutics I

Course Outline:
A. Introduction to Quality Control
B. General Principles: Monograph Definitions, Standards and
Course Name: Quality Control II - Drug Testing and Assay with Instrumentation
(Pharm. Chm. 4)

Course Description: This is a continuation of Quality Control I with application of instrumental methods of analysis. It includes the principles, organization and function of quality control in the pharmaceutical and cosmetic industry, in-process test, the use of quality control charts for solid pharmaceuticals, stability testing as well as quality assurance functions in various stages of manufacture are discussed.

Course Objectives:
1. To master the general quality control process and validation procedures.
2. To apply the principles of instrumental methods of analysis in various pharmaceutical products.
3. To understand the application of stability issues, statistical quality control as tools for evaluating.
Number of Units: 4 units (2 units lecture, 1 unit laboratory)

Number of contact hours: 3 hours lecture, 3 hours laboratory per week

Pre-requisites:

Course Outline:

1. Introduction
2. Quality Control
3. Sampling and Sampling Plans
4. Material Control
5. Manufacturing Control
6. Packaging Control
7. Distribution Control (Finished Goods Warehouse)
8. Statistical Quality Control
9. Stability Studies
10. Solution Testing
11. Validation
12. Instrumentation
1. Spectroscopy
2. Electrometric Method

3. Chromatography
4. Radiometry

Laboratory Equipment: See Annex B (List of Laboratory Equipment, Facilities and Supplies)

Tests and References:

> Lessar, Nonna V. and Ole, Marine G. Drug and Cosmetic Quality Control with Instrumentation.
> World Health Organization. WHO Expert
Course Name: Clinical Toxicology
(Pharm. Chem. 5)

Course Description: The fundamentals of clinical toxicology including a study of the general classes of toxic agents, evaluation of toxicity, target organ toxicity, management, and their detection.

Course Objectives: At the end of the course, the student should be able to:
1. Acquire basic knowledge in the origin and type of exposure, modes to the induction of toxicity and evidence in poisoning.
2. Identify the commonly encountered poisonous chemicals and drugs to man and his environment.
3. Manifest the pharmacist's responsibility in the risk assessment and management of poisoning.

Number of Units: 3 units (3 units lecture, 1 unit laboratory)

Number of contact hours: 2 hours lecture, 3 hours laboratory per week

Pre-requisites: Pharmacology 1, Pharmacology 2 (co-requisite)

Course Outline:
1. General Concepts
2. Clinical Toxicology
   1. Principles of Clinical Toxicology
   2. Control Management of a Suspected Poisoned Patient
3. Management of Specific Poisons
   a. Therapeutic agents
   b. Drugs of Abuse
   c. Household Poisons
   d. Pesticides
   e. Heavy metals
   f. Inhalatory Poisons
   g. Environmental Poisons
Course Name:

Pharmaceutical Administration and Management I (Ph Ad & Mgt I)

Course Description:

This is an introductory course designed to teach the concepts, principles, and fundamentals of pharmaceutical administration and management. This includes the basic functions of planning, organizing, staffing, directing and controlling as they refer to fiscal, personnel and overheading management. The course is also intended to provide the students with the tools and skills necessary to effectively manage themselves and to participate fully in their organizations in a changing world environment.

Course Objectives:

At the end of the course, the students should be able to:

1. Increase awareness of management principles and functions in pharmacy practice
2. Define and discuss the concepts of management and administration
3. Understand financial reports and be able to analyze the financial position of a business
4. Understand the importance of inventory management and be able to analyze the importance of inventory control in the financial viability of a pharmacy
5. Understand the role of managing human resources in pharmacy practice
6. Understand the role of personnel management functions and their role in organizational effectiveness and efficiency
7. Apply management principles in a simulated business setting via case studies and related exercises
Course Name: Marketing and Entrepreneurship
(Ph Act & Mgt 2)

Course Description: The course deals with concepts, theories and principles of marketing such as product, price, promotion and place of distribution combined with learning about entrepreneurship. It includes applications through case study methods and business planning, and marketing strategies and elements of display.

Course Objectives: At the end of the course, the students should be able to:
1. Identify the pharmaceutical industry and the pharmaceutical market system.
2. Distinguish the difference between marketing and entrepreneurship.
3. Understand marketing theories and be able to implement it accordingly.
4. Identify the target market and be able to come up with a business plan or a feasibility study.

Number of Units: 3 units
Number of contact hours: 3 hours lecture per week
Prerequisites: Pharmaceutical Administration and Management I
Course Outline:
I. The Pharmaceutical Industry in the Philippines
II. The Health Care Business in the Philippines
III. Pharmaceutical Marketing: The Marketing System, Market and Products
IV. The Marketing Management Process in the Drug Industry
V. Entrepreneurship
VI. Business Plan

Text and References:

Course Name: Pharmaceutical Jurisprudence and Ethics
(Pharm Jurisprudence and Ethics)

Course Description: The course deals with the study of legal rules and regulations as applied to pharmacy and Pharmacy practice. It also instills a code of ethics of the profession.

Course Objectives:
At the end of the course, the students should be able to:
1. Acquire a theoretical and practical knowledge regarding the legal and ethical control of the pharmacy education and the practice of the profession.
2. Identify the rights and duties of the pharmacists towards the public, colleagues, pharmacy assistants, physicians and other allied medical professionals.
3. Appraise the different provisions of the law concerning the pharmaceutical education and profession.

Number of Units: 3 Units
Number of Contact Hours: 3 hours lecture per week
Course Name: Pharmacy Informatics (Computer 2)

Course Description: An introduction to methods of gathering and using drug and health-related information from various sources with focus on Information Communication Technologies (ICT) using different web sites and search engines.

Course Objectives: At the end of the course, the students should be able to:
1. Describe various sources of information and their use.
2. Successfully search and retrieve information for...
3. Different drug and health information needs, and
4. Evaluate the quality of information obtained from various sources based on a set of criteria.
5. Utilize the retrieved information in solving drug therapy problems, evaluation of drugs, patient counseling, research studies, and in writing and health education.
6. Present a design brief addressing recent pharmaceutical and health-related issues.

Number of Units: 4 units (2 units lecture, 1 unit laboratory)
Number of contact hours: 3 hours lecture per week

Pre-requisites: Computer I

Course Outline:
I. Importance of Drug and Health Information in Pharmacy Practice
   A. Current uses of drug and health-related information in various areas of the practice of pharmacy
   B. Definitions
   C. Classification and examples of information relevant to pharmacy practice
   II. Various Information Sources
       A. Primary Sources
          1. Description and uses
          2. Limitations
          3. Examples
       B. Secondary Sources
          1. Description and uses
          2. Limitations
          3. Examples
       C. Tertiary Sources
          1. Description and uses
          2. Limitations
          3. Examples
   III. The Internet and Other Sources of Information
       A. Description and uses
       B. Limitations
       C. Examples of websites and their available drug information

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and health-related information.

IV. Search Process
A. Internet search engine and keyword searching.
B. Classification of questions as clinical or research-related.
C. Gathering of additional relevant patient information.
D. Identification of search keywords, synonyms, and related terms.
E. Formulation of search strategies.
F. Search of relevant resources.
G. Evaluation of information.
H. Formulation of conclusions.
I. Follow-up and dissemination.

V. Guidelines for Formulating Responses to Drug Information Requests

VI. Considerations in the Evaluation of Biomedical Literature

VII. Publication Writing

VIII. Exercises on Drug and Health-Related Information Sources

<table>
<thead>
<tr>
<th>Laboratory Equipment</th>
<th>Computer with internet connection, LCD, printer, Laptop</th>
</tr>
</thead>
</table>
> > Drug Information 200.  
> > Rangarajan’s The Science and Practice of  
> > Chang’s Comprehensive Review of Pharmacy,  
> > 2003.  
> > American Journal of Pharmaceutical Education  
> > Biomedical Journals  
> > Drug Info Software, eFirst, ClinTrials. MIMS CD  
> > Internet websites |

| Course Name | Research and Thesis Writing 1 & 2  
| (Research 1 and 2) |
| Course Description | This course deals with the specific problem related to pharmaceutical sciences that would be solvable to investigate using the laboratory work. It will explore several pharmaceutical and pharmacological problems and animal testing which will be conducted inside the laboratory. It also includes the thesis writing after experimental results are completed. |
| Course Objectives | At the end of the course, the students should be able to: |

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1. Rationalize the purpose(s) of choosing the problem for research.
2. Discuss the steps of the procedure for the investigation.
3. Present, organize, analyze and interpret the data collected and write scientifically.
4. Begin an independent study using logical thinking and scientific methods.
5. Gather new knowledge or data from primary or first-hand sources and not merely recite or restate what is already known or has been written.
6. Perform successfully the experimental procedures in the laboratory portion of the subject.

Present and defend a written outcome of the research.

Research & Thesis Writing 1: 3 units (1 unit lecture, 2 units laboratory)
Research & Thesis Writing 2: 1 unit (1 unit lecture, 1 hour lecture per week)

Pre-requisites: Senior Standing

Course Outline:

Unit 1 - Introduction to Research and Thesis Writing
A. Definitions in the course objectives and outcomes
B. Form and Style
C. The research problem
Laboratory
a. Research and referencing
Unit 2 - Review of Relevant Literature
A. Types of Literature
B. Bibliography and Citations
Laboratory
a. Literature
Unit 3 - Review of Basic Statistics and Research Methodology
A. Sampling
B. Statistical Formulas
C. Statistical models

Number of Units: Research and Thesis Writing 1: 3 units (1 unit lecture, 2 units laboratory)
Research & Thesis Writing 2: 1 unit (1 unit lecture, 1 hour lecture per week)
Laboratory Equipment:

- See Annex B (List of Laboratory Equipment, Facilities and Supplies)

Texts and References:
- *Books on Medicinal Plants prepared by R:
  - Oehmke, 1st ed.
  - Parkin and other published resources, both local and foreign sources
- Fitzgerald Formulary
- *USP/International edition
- Remington's Pharmaceutical Sciences, little edition
- Chemical Formulary of Formulations
- Pharmaceutical Books and manuals
- Quantitative Pharmaceutical Chemistry books authored by Jann's and similars
- Pharmaceutical Orange Press and Drug Delivery Systems by Standard Abell
- Books on Chemical Investigation of Plants, authored by R. Meyerköver
- Journals and Magazines on Plant or Herbal Medicines

Article VII

GENERAL REQUIREMENTS

Section 12: Program Admission

a.) The required prerequisite of pharmacy shall be administered by a duly registered Pharmacy Board with the following minimum qualifications:

- must be a currently registered pharmacist with a related degree in pharmacy,
- must have at least one year of teaching experience, preferably with two (2) years administration or supervisory experience,
- must be a member of the PDA standing in national pharmacy organization.
b) The general function and responsibility of the Dean is to effectively and efficiently manage the pharmacy education program.

Section 13. Faculty

d) Qualifications

The faculty for the professional pharmacy courses must have the following qualifications:

- A current registered pharmacist.
- Have completed a Master's degree in their major field and/or allied fields, and must have completed at least 12 semester hours in the field.
- An active member of accredited pharmacy and professional organizations and professional organizations in proper document.

b) Teaching assignments/Load

The faculty must have a teaching assignment that is in accordance with the academic preparation.

The teaching load must be in accordance with the provisions made in the Manual of Regulations for Private Schools/Pharmacy Examinations and Colleges.

c) Employment Status

At least sixty percent (60%) of the total number of faculty handling professional subjects must be full-time.

Section 14. Library

a) Collection

Every school/college/university offering Pharmacy Program should have a faculty-limited library.

b) Book Collection

- There should be at least three (3) copies of each edition per professional course. (Appendix A-50 book collection)
- There should be at least five (5) titles representing 2 scientific and/or professional journals as well as periodicals.
- There should be at least three (3) books representing scientific and professional journals and equipment including computers and interned content.
Annex A
List of Book Collections

I. GENERAL EDUCATION SUBJECTS (3.9 hrs per week)
   1. UNICEF Skills and
   2. Research
   3. Introduction to Literature
   4. General Psychology
   5. Book Arrangement
   6. English
   7. Religion
   8. Science Fiction
   9. Short Stories
   10. Plays
   11. Poetry
   13. Physics
   14. Health Education
   15. Computer Science
   16. Health Ethics
   17. Philosophy
   18. English
   19. Philosophy
   20. Psychology
   21. Psychology
   22. Psychology
   23. Psychology

II. CORE SUBJECTS (2 hrs per week)
   1. Pharmacology Introductory
   2. Human Anatomy and Physiology with Pathology-c-50
   3. Clinical Skills
   4. Community Health Education and Practice
   5. Preclinical Communication Skills for the Practitioner
   6. Community Health
Section 15. Facilities and Equipment

a) Classroom requirements

The school's / college's department of pharmacy must provide lecture and laboratory spaces, facilities, materials, and equipment that are adequate for instruction, laboratory work, and research.

b) Laboratory requirements

The school's / college's department of Pharmacy should have a laboratory coordinator, who is a registered pharmacist to oversee the needs of pharmacy laboratory courses.

- A laboratory room should:
  - be well-lighted, well-ventilated and well
    - maintained, and provided with accessibility
    - functional safety devices and first aid facilities.
- Have adequate working and fire spaces for the convenience of students and faculty.
- Have laboratory tables that are chemical-resistant and fire-resistant.
- Have a minimum desk space of one (1) square meter per student.
- Have one (1) locker per 1-4 students as needed.
- Have two (2) doors for entrance and exit.

• Separate laboratories for the physical, biological, pharmaceutical sciences and research should be provided.

- Facilities in the science laboratory should include:
  - A sufficient and adequate supply of purged/inerted water, electricity properly identified as to voltage, water, and gas.
  - Safety, emergency, and first aid devices, such as fire extinguisher, first aid kit, emergency shower, eye wash station, exhaust system and fume hoods should be available, accessible and properly maintained.
  - There must be separate storage areas for chemicals and equipment under the supervision of a trained laboratory technician.

4. Laboratory equipment

- Equipment and supplies should:
  - Be adequate for each laboratory course based on the year level and number of students.
  - Be functional, properly maintained, and periodically calibrated.
  - Include other teaching aids as needed for efficient instruction in the laboratory.

- Provision should be made for maintaining live plants, animals and microorganisms for study.
Special equipment should be provided for the teaching of pharmaceutical pharmacy courses.

 Adequate space should be provided in the school campus for botanical garden.

 There should be a separate well-maintained animal house.

Audio-visual equipment

There should be a separate multi media facilities consisting of OUP, LCD, VHS, computer with internet access (if possible) to enhance interaction of professional pharmacy courses.

Annex B

List of Laboratory Equipment / Facilities / Supplies

A. PHYSICAL, PHARMACY AND QUALITY CONTROL LAB I

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH and Sided Digital</td>
<td>Pipettes</td>
</tr>
<tr>
<td>MTP and Digital</td>
<td>Volumetric</td>
</tr>
<tr>
<td>Rebalance Voice</td>
<td>Volumetric</td>
</tr>
<tr>
<td>Cenla for Dry</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Metallising Piping</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Bhet of 10 and 25 Mm</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Beaker Apparatus</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Autotitration End</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Hardness Tester</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Hyperthermed</td>
<td>Pipettes</td>
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<tr>
<td>Burn (carbon)</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Aspirator</td>
<td>Pipettes</td>
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<tr>
<td>Transparent</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Sample cradles</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Suction apparatus</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Serology</td>
<td>Pipettes</td>
</tr>
<tr>
<td>Cheek</td>
<td>Pipettes</td>
</tr>
</tbody>
</table>

B. PHARMACUTICS 1 AND 2

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom 1 - set per group</td>
<td>Isotonic sodium (perfusory)</td>
</tr>
<tr>
<td>Eggs (sized)</td>
<td>Filling apparatus</td>
</tr>
<tr>
<td>Cofa-Bathy leaves</td>
<td>Weighting machines</td>
</tr>
<tr>
<td>Filtered leaves</td>
<td>Nectar and syrups</td>
</tr>
<tr>
<td>Blotting</td>
<td>Compounding</td>
</tr>
<tr>
<td>Filler</td>
<td>Vials</td>
</tr>
<tr>
<td>Tablet making/compression machine</td>
<td>Counting machines</td>
</tr>
<tr>
<td>PI file</td>
<td>Counting machine</td>
</tr>
<tr>
<td>Capsule fill</td>
<td>Counting machine</td>
</tr>
<tr>
<td>Syrupal</td>
<td>Counting machine</td>
</tr>
<tr>
<td>Suppository mix</td>
<td>Counting machine</td>
</tr>
</tbody>
</table>

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O. PHARM CHEM OF MEDICINAL & PLANT CHEMISTRY/PHARMACEUTICAL BOTANY RESEARCH

Safety Glasses
Sterile Apparatus
Cocking unit
Pipettes
Tit Raker Chromatograph
Spiner Rotator
Suction Filter
Alcohol Burner
Separatory Funnel

Reagents:
Methanol
Acetone
Ethanol
Isopropyl Alcohol
Quinol
Melting Point Apparatus
Drying Gear
Molten Fluorescein
Silver Nitrate
Sodium Hydroxide
Hydrochloric Acid
Nitric Acid

D. IMMUNOLOGY & BIOCHEM

4th Generation
Shaker
Centrifuge
Water bath
Extraction Buffer
Glass siphons
Oxidation redox indicators
Soda lime
Mannitol

G6PD deficiency

QuantiTec Step One Plus PCR System
Separatory funnel
pH meter
Filtration
Trip leav balance
pH paper
Bunsen burner
Whatman filter paper
Coarse clay
Good with towel
Filter paper

Wheat germ extract
Chromatography
Filter paper

E. MICROBIOLOGY AND PARASITOLOGY

Antiseptics
Antibiotics
Diseases
Inoculating Loop
Inoculating Teardrop loop
Inoculating Wire loop

Oxidation
Gases
Oxidation and reduction reactions
Paste diluent
Dipping sticks

P. PHARMACOLOGY, TOXICOLOGY, ANATOMY & PHYSIOLOGY

Propylene

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Section 15. Instructional Standards

- The institution shall maintain a high standard of quality instruction.
  - All the courses shall have course syllabi with appropriate teaching strategies and methods.
  - The institution shall provide for a continuing faculty development program by providing logistical support.
  - It shall provide for a systematic and continuing plan of evaluation of student progress through a grading system that is continuous and congruent with the objectives set by the college/university.
  - The pharmacy curriculum program may adopt any textbook of the latest edition which reflects current trends in the pharmacy profession. Adopted textbook materials may be changed only once in any three (3) years.

- The ratio of faculty to students in science laboratory classes should be a minimum of 1:35.

- Evaluation must be part of the teaching-learning process and the students must be informed of the results. A variety of appropriate test and assessment methods must be utilized.

- The internship training program should be monitored, where the student develops professional pharmacy skills by a systematic application of scientific knowledge to actual life situations in the community pharmacy, hospitals, and pharmaceutical industry.

The following conditions shall be considered:
- There shall be a close correlation of theoretical knowledge to the Internship Training Program.
- The Internship Training Program shall be organized to meet the objectives of the Pharmacy education program.
- The Internship Training Program should be conducted in drug establishments and centers accredited by the Bureaus of Foods and Drugs (BFAD).
- There must be a pharmacy internship coordinator for each area of pharmacy practice with corresponding compensation.
- Student interns shall undergo training for 200 hours in each of the three (3) areas (community, hospital, industry) and an additional 200 hours for the chosen area as their major field.
- Student interns shall submit proof of completion for each internship area with evaluation in a prerequisite for graduation.

Section 17. Research

- The school/college/university must encourage basic and applied research activities in the field of pharmacy to be done by competent and academically qualified research faculty members.
- Faculty members assigned to do research activities shall be credited with an equivalent teaching load for those engaged in research activities in accordance with the university's policy.
- The evaluation of research shall be included and growth rewards among its students and faculty members for the improvement of the pharmacy program.

Section 18. Admission and Retention

- The applicant for admission to a degree course in Pharmacy must:
- Have graduated from a general secondary course authorized by the government.
- Have satisfactory compliance with the admission requirements of the school/college/university.

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Section 19.

A school and college of pharmacy that failed to comply with the minimum requirements set in the policies and standards shall not be issued permit to operate the program. (As mentioned earlier)

A recognized school and college of pharmacy that failed to maintain compliance with the minimum requirements set in the policies and standards after monitoring and evaluation by the Technical Committee for Pharmacy Education shall be initially issued a warning. The program shall be recommended for phase out and eligible to comply with the deficiencies noted within one (1) year upon receipt of the warning.

A school and college of pharmacy that failed to comply with the average cut-off percentage passing in the governance licensure examination for the (1) academic years shall be recommended for phase out of the program. The average cut-off pass rate passing shall be determined by CHED upon the recommendation of the Technical Committee for Pharmacy Education.

Article XXI

REPEALING CLAUSE

Section 20.

This Order repeals and supersedes all previous issuances concerning Pharmacy Education which may be inconsistent or in conflict with any of the provisions hereof.

Article XXII

EFFECTIVITY CLAUSE

Section 21.

This act of Policies and Standards for Pharmacy Education shall take effect beginning school year 2006-2007.

Yrjo City, Philippines, March 10, 2026.

[Signature]

Carlo S. Pena
Chairman

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