

Course Name: Pharmaceutical Microbiology	الأحياء الدقيقة الصيدلانية إسم
Course Code & No.: PHT123	رقم المقرر رقم المقرر ١٢٣ صيد
Credits: 3(2+1+0)	عدد الساعات: 3(2+1+0)
Prerequisite: 106BIOL	المتطلب: 1٠٦ حين
Level: 2	المستوى: 2

Objectives

1. To describe basic medical microbiology focusing on biological properties of different groups of microbes; their classification, nomenclature, structure, nutrition, metabolism, cultivation, growth and genetics
2. To explain etiological agent(s), mode of infection, pathogenesis, laboratory diagnosis, prevention, diseases surveillances, control, and treatment of the most medically important infectious diseases.

Course Learning Outcomes

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

Knowledge:

1. List the names of classification systems used in microbiology, the name the shapes and arrangement of different groups of microbes, and define the growth characteristics, nutritional requirements, and cultivation methods of microorganisms.
2. Explain the differences among different groups of microorganisms (Bacteria Rickettsiae, Mycoplasma, Chlamydiae, Viruses and Fungi).

Cognitive skills (Major) and communication skills (Minor)

1. Develop awareness of microbial control and the methods of collection, handling and processing the clinical specimens recommended for laboratory diagnosis of the infectious diseases. @
2. Predict the awareness about the most medically important infectious diseases in terms of their etiological agent(s), mode of infection, pathogenesis, symptoms, laboratory diagnosis, prevention and control. @
3. Write on microbial genetics (mutation, conjugation, transformation and transduction) and brief genetic basis of antimicrobial resistance.
4. @Develop the necessary skills to differentiate, the nature of both endemic and epidemic disease, their diagnosis, and the epidemiological and/or microbial surveillance studies @.

Interpersonal Skills & Responsibility(minor)

including the ability to: - Show continuing personal and professional development, - Demonstrate leadership effectively within groups when appropriate, - Ability to judge reasonably and ethically with high moral standards in personal and public forums.

Communication, Information Technology, Numerical (very minor)

Ability to communicate fairly effectively in oral

Psychomotor:

1. Examine different groups of microbes. Perform cultivation, prepare smears, and examine them microscopically. Operate different types of microbiological equipments in the lab. Perform work under aseptic conditions.

Course Contents:

- History of Microbiology and the world of microorganisms.
- Classification and fundamental characteristics of microbes, eukaryotic and prokaryotic cells.
- Nomenclature and structure of bacteria.
- Growth characteristics of bacteria.
- Cultivation methods.
- Bacterial genetics.
- Different groups of fungi (yeast, yeast-like fungi, filamentous and dimorphic fungi).
- Gram-positive cocci:
 - Staphylococci.
 - Streptococci.
 - Pneumococci.
- Gram-negative cocci:
 - Neisseria gonorrhoea.
 - Neisseria meningitidis.
- Gram-positive spore forming bacilli:
 - Aerobic Gram-positive spore forming bacilli:
 - Bacillus anthracis and other Bacillus species.
 - Anaerobic Gram-positive spore forming bacilli:
 - Clostridium perfringens.
 - Clostridium tetani.
 - Clostridium botulinum.
 - Clostridium difficile.
- Gram-positive non spore forming bacilli:
 - Corynebacterium diphtheriae and diphtheroid bacilli.
 - Listeria monocytogenes.
- Fermentative Gram-negative rods
 - Enterobacteriaceae
 - Oxidative Gram-negative rods
 - Pseudomonas organisms.
 - Malta fever.
 - Bordetella and Haemophilus species.
 - Vibrios and Helicobacter.
- Tuberculosis.
- Spirochetes.
- Rickettsial Diseases.
- Superficial and systemic mycotic infections.

Laboratory Schedule:

- Good Microbiological practice.
- Distribution of microorganisms in different environments.
- Microscopic examination of microorganisms:
- Preparation and fixation of bacterial smear.
- Bacterial staining.
- Simple staining.
- Negative stain.

- Differential staining:
- Gram stain.
- Special staining:
- Zeihl-Neelsen's acid-fast stain.
- Sporestain.
- Capsulestain.
- Culture media:
- Ordinary media.
- Enrichment media.
- Media for anaerobic bacteria.

Enriched media.

- Selective and differential media
- Media for fungi.
- Isolation and purification of pure colonies (streaking method).
- Bacterial count.
- Motility techniques.
- Antimicrobial susceptibility testing:
- Minimum Inhibitory Concentration (MIC).
- Disk diffusion method.
- Antibiotic assay.
- Collection, handling and processing of clinical specimens. Staphylococci and streptococci
- Spore forming and non spore forming Gram-positive bacilli.
- Bacillus and Clostridium species.
- Corynebacterium and Listeria species.
- Fermentative and Oxidative Gram-negative rods.
- Enterobacteriaceae.
- Pseudomonas species.
- Acid-fast organisms.

Evaluation methods:

10-Periodicals

20-(2 Midterm exams)

20 Practicals

50-Final Exam

Text Book(s):

Koneman, EW; Allen, SD and Janda, WM et al. "Color Atlas and Textbook of Diagnostic

Microbiology", 5th. Ed., 1997, Lippincott Company, USA.

Murray, PR; Baron, EJ; Pfaller, MA et al. "Manual of Clinical Microbiology", 7th. Ed., 1999, ASM

Press USA..

Black, JG "Microbiology Principles and Explorations", 4th. Ed. 1999, John Wiley & Sons, Inc.,

USA.

Colle, JG; Fraser, AG; Mannion, BP and Simmons, A "Mackie and McCartney, Practical Medical

Microbiology" 14th. Ed. 1996, Churchill Li

Course Name: Pharmaceutics-I	إسم الصيدلانيات-1
Course Code & No.: 212 PHT	رقم المقرر 212 صيد
Credits: 3 (2+1+0)	عدد الساعات: 3 (2+1+0)
Prerequisite: 135MATH	المتطلب: 135 رياض
Level: 3	المستوى: 3

Course Description (AIM):

. In this course, the principles of chemistry, physics and mathematics are applied to the pharmaceutical sciences. solubility, partitioning, reaction kinetics and stabilization of formulations will be considered.

Objectives:

- Fundamentals of measurement and calculation in pharmaceutics
- Assessment of the physical and chemical data in order to evaluate the stability of a given formulation.
- The compounding of different liquid dosage forms.

Learning outcome:

Upon successful completion of this course, students will be able to:

1-Knowledge

- a. Record different types of solution dosage forms
- b. Outline different types of concentration (Percentage strength, PPM etc...
- c. List international systems of units
- d. state methods of isotonic preparations.

2-Cognitive skills:

- a. compare between ratio and proportion.
- b. Differentiate between three state of matter.
- c. Explain Phase rule and phenol water system
- d. Estimate different methods of preparation aromatic water, syrups and elixirs

4.Numerical skills

- a. Calculate ratio and proportion using different methods
- b. Calculate different concentrations using alligation method
- c. Evaluate isotonic solutions

4-Psychomotor skills

- a. Perform solubility enhancement tests by co- solvent method
- b. Draw miscibility of solvents in binary and ternary systems
- c. Prepare different pharmaceutical solution dosage forms
- d. perform dilution and alligation of alcoholic solution

Course Contents:

- Fundamentals of Pharmaceutics.
- Mathematics: basic pharmaceutical principles.
- Fundamentals of measurement and calculation.
- .Isotonicity
- States of matter
- Introduction into pharmaceutical solution dosage form

- syrups
- Elixires
- Stability of pharmaceuticals and basic chemical kinetics.
- Partitioning, diffusion and dissolution.

Practical Schedule:

- Introduction and general instructions:
- Laboratory safety and chemical hazardous.
- Dilution and alligation of alcoholic solutions
- Isotonic Preparations
- Solubility enhancement by co-solvent method
- Phenol-water system
- Miscibility of solvents
- Preparation of iodine&ferrous sulphate syrup
- Preparation of simple syrup & expectorant
- Preparation of elixir
- Chemical kinetics I.
- Chemical kinetics II

Text Book(s):

Alfred Martin. Physical Pharmacy. Lea & Febiger, Philadelphia PA.

Mitchell Stokiosa and Howard Ansel. Pharmaceutical Calculations. Williams & Wilkins, Philadelphia, PA.

Alfonso Gennaro, Remington: The Science and Practice Of Pharmacy, Williams & Wilkins, Baltimore, MD.

Course Name: Pharmaceutics-II	إسم الصيدلانيات-2
Course Code & No.: 223 PHT	رقم المقرر 223 صيد
Credits: 3(2+1+0)	عدد الساعات: 3(2+1+0)
Prerequisite: 212PHT, 135MATH	المتطلب: 212 صيد، 135 رياض
Level: 4	المستوى: 4

Course Description (AIM):

This course provides an understanding of various dosage forms and drug delivery systems, and how medicinal and pharmaceutical substances are incorporated into them. The fundamental principles of interfacial phenomena, dispersion system, rheology and their impacts on the preparation and design of stable dosage forms will be discussed.

Objectives:

- Components and technologies involved in the development, manufacture and evaluation of various dosage forms.
- The principles to design the appropriate dosage forms.
- The applications of pharmaceutical polymers and excipients.

Learning outcome:

Upon successful completion of this course, students will be able to:

1-Knowledge

- a. Record different types of suspensions and emulsions
- b. List different types of flows (Newtonian & non Newtonian systems)
- c. State different applications of Thixotropy
- d. Name different types of semisolid dosages forms (creams, ointments. Pastes,etc.....)
- e. List different types of suppository bases
- f. Recognize different types of respiratory dosage forms

2- cognitive skills

- a. Differentiate between different types of suspensions
- b. Compare between different types of emulsions
- c. Explain different types of semisolid dosages forms (creams, ointments. Pastes,etc.....)
- d. Evaluate different types of suppository bases
- e. Differentiate between respiratory dosage forms.

3-Numerical skills

- a. Calculate the displacement value in molded suppository preparation
- b. Calculate of viscosity parameters

4- Psychomotor skills

- a. Prepare different types of suspensions (magnesium trisilicate).
- b. Prepare different types of emulsions
- c. show surface tension and viscosity on certain solutions.
- d. Perform of suppositories (plain and medicated).

Course Contents:

- Surface and interfacial phenomena.
- Colloidal systems and coarse dispersion.
- Rheology.
- Oral suspensions and emulsions.
- Semisolids dosage forms (topical ointments, creams and gels).
- Rectal drug delivery system
- Aerosols, inhalants and sprays

Practical Schedule:

- Preparation of magnesium trisilicate oral suspension.
- Preparation of calamine lotion.
- Preparation of pharmaceutical emulsions.
- Determination of Viscosity
- Determination of surface tension
- Preparation of castor oil emulsion
- Preparation of cold cream.
- Preparation of simple ointment
- Preparation of suppositories.

Text Book(s):

Howard Ansel, Nicholas Popvich and Lloyd Allen, Pharmaceutical Dosage Forms and Drug Delivery Systems. Lea & Febiger, Philadelphia, PA.

Alfonso Gennaro Remington: The Science and Practice of Pharmacy. Williams & Wilkins, Baltimore, MD.

L. Lachman, H. A. Lieberman and J. L. Kanig. The Theory and Practice of Industrial Pharmacy. Lea & Febiger, PA.

G.S. Banker and C.T. Rhodes Modern Pharmaceutics, Marcel Dekker, Inc., New York, NY,

M.E. Aulton: Pharmaceutics: The Science of Dosage Form Design, Churchill Livingston, St Louis, MO.

Course Name: Pharmaceutics-III	إسم الصيدلانيات-3
Course Code & No.: 323 PHT	رقم المقرر 323 صيد
Credits: 3(2+1+0)	عدد الساعات: 3(2+1+0)
Prerequisite: 223PHT	المتطلب: 223 صيد
Level: 5	المستوى: 5

Course Description (AIM):

. This course covers the principles and techniques involved in the formulation, preparation and evaluation of solid dosage forms and sterile dosage forms. Methods of sterilization and applications of aseptic techniques will also be studied.

Objectives:

- Formulation methods of powder, granules and solid dosage forms (tablets and capsules).
- Principles for sterile products.

Learning outcome:

Upon successful completion of this course, students will be able to:

1-Knowledge

- a. List different methods for measuring the flow of powder.
- b. Outline different types of tablets and excipients.
- c. Name different types capsules and excipients
- d. List different types of sterile products forms
- e. Describe the manufacturing of Parenteral products

2- Cognitive skills

- a. Estimate different methods used for evaluation of tablets
- b. Analyze different methods used for evaluation of capsules.
- c. Differentiate between different types of ophthalmic products
- d. Summarize different methods used for evaluation of Parenteral dosage form.

3-Psychomotor skills

- a. Preparation of effervescent granules
- b. Preparation of tablet using different methods .
- c. Perform dissolution tests .
- d. Perform quality control tests for tablets and capsules

Course Contents:

- Powder and granules.
- Tablets .
- capsules.
- Introduction into sterial products.
- Sterile products: Parenterals.
- Ophthalmic products.
- Sterilization principles
- GMP and clean room

Laboratory schedule:

- Flowability of Powder and Porosity

- Preparation of Effervescent Granules.
- Tablet press & Dissolution testing.
- Quality Control Test for Tablets.
- Capsule Filling and Quality Control of Capsule.
- Isotonic preparations
- Preparation of Ophthalmic product
- Preparation of Nasal and Ear Products.
- Preparation of a Parenteral Products.
- Sterilizations methods and Autoclave

Text Book(s):

A.J. Winfield and R.M. Richards: Pharmaceutical Practice, Churchill Livingstone, St. Louis, MO, USA.

Salvatore Turco, Sterile Dosage Forms Their Preparation and Clinical Application. Williams & Wilkins, Baltimore, MD.

Course Name: Basic Pharmacokinetics	إسم المقرر: أساس حركية الدواء
Course Code & No.: 336 PHT	رقم المقرر: ٣٣٦ صيد
Credits: 2(2+0+1)	عدد الساعات: 2(2+0+1)
Prerequisite: 135MATH	المتطلب: ١٣٥ رياض
Level: 9	المستوى: 9

Course Description (AIM):

This course is designed to acquaint the student with the fundamental concepts that determine the time course of drug concentrations in the body, during single and chronic dosing. The course will cover the basic principles and concepts of pharmacokinetics and pharmacodynamics that affect the absorption, distribution, metabolism, excretion and action of drugs in the body.

The main course objectives include:

- 1- The fundamental concepts that determine elimination, distribution, absorption and time course of drug concentrations in the body, during single and chronic dosing.
2. Principles for the design of dosage regimen for an individual patient for different routs of drug administration

Learning outcomes:

1- Knowledge:

- a. Define the different pharmacokinetic models and parameters.
- b. Describe the characteristics of linear and non-linear pharmacokinetics..
- c. Describe the rout of drug administration and define drug clearance
- d. Memorize the basic equations used in pharmacokinetic

2- Cognitive Skills:

- a. Calculation of maintenance and loading dose for different rout of administration
- b. Calculation of drug concentration at any given time after drug administration for different rout of administration

3- Interpersonal Skills & Responsibility:

- a Choose the appropriate dose and time interval to achieve the desired drug concentration in plasma.

4- Communication, information Technology, Numerical:

- a. Calculate slope and intercept by using scientific calculator

5- Psychomotor:

- a. Draw data on semi log and ordinary paper to estimate pharmacokinetic parameters.

Course Contents:

- Introduction in Pharmacokinetics
- Pharmacokinetics models and methods of determination of drug concentration
- Compartmental pharmacokinetics model
- One compartment mode IV bolus injection
- Two compartment mode IV bolus injection
- Single orally administration
- Intravenous infusion (IV infusion)
- I.V infusion plus loading dose
- Multiple IV administration
- Multiple orally administration
- Non- linear pharmacokinetics

Tutorial schedule:

- Comparing between zero order and first order reaction..
- Plotting of data on rectangular and semi-logarithmic scales.
- Calculation of pharmacokinetic parameters using one compartment model: IV bolus.
- Calculation of pharmacokinetic parameters using urine sample after IV bolus by using the Rate method
- Calculation of pharmacokinetic parameters using urine sample after IV bolus by using the Sigma minus method
- Calculation of pharmacokinetic parameters using two compartment model: IV bolus.(Residual method)
- Calculation area under the plasma drug concentration curve [AUC} after IV bolus and after single orally administration.
- Calculation of pharmacokinetic parameters after single orally administration (Residual method).
- Calculation of C_{ss} and infusion rate from IV infusion data (slow infusion)

- Calculation of C_{ss} and infusion rate from IV infusion data (rapid and slow infusion)
- Calculation of loading dose in combination with IV infusion
- Calculation of drug concentration at any given time during multiple IV administration
- Calculation of drug concentration at any given time during multiple orally administration
- Dose design regimen for multiple IV (time interval, maintenance dose and loading dose).
- Dose design regimen for multiple oral administrations (time interval, maintenance dose and loading dose).

Evaluation methods:

- 10-Periodicals
- 30-(2 Midterm exams)
- 60-Final Exam

Text Book(s):

- M. Gibaldi and D. Perrier, Pharmacokinetics, Marcel Dekker, Inc., NY, USA. 2nd Edition, 1982.
- L. Shargel and A.B.C. Yu, Applied Biopharmaceutics and Pharmacokinetics, Appleton & Lange, Stanford, CT, USA. 5th edition, 2005.
- WA. Ritschel and G.L. Keams, Handbook of Basic Pharmacokinetics Including Clinical Applications, American Pharmaceutical Association, Washington, DC, USA.
- A.R. Gennaro, Remington: The Science and Practice of Pharmacy, Mack Publishing Co., Easton, PA, USA. 7th edition, 2009.

Course Name: Biopharmaceutics	إسم المقرر: الصيدلة الحيوية
Course Code & No.: 345 PHT	رقم المقرر: ٣٤٥ صيد
Credits: 2(2+0+0)	عدد الساعات: 2(2+0+0)
Prerequisite: 335PHT	المتطلب: ٣٣٥ صيد
Level: 10	المستوى: 10

Course Description (AIM):

This course will deal with the effects of the physicochemical properties of the drug, the formulation factors, the dosage form, the route of administration and the physiological factors on the rate and extent of systemic drug absorption. Also in vitro methods and the application of different equations used to study the dissolution from dosage forms will be discussed. The concept of clearance and the mathematical relationships that describe drug – protein binding and methods used for study and calculation of dissolution parameters from dosage forms.

The main course objectives include:

- 1-The concepts of biopharmaceutic terminology and principles of drug transfer from the dosage form to the gastrointestinal fluids as well as the arrival of drug at the systemic circulation after oral administration.
2. Principles and applications of formulation factors affecting oral absorption.
- 3- Mathematical relationships that describe drug – protein binding and methods used for estimating of dissolution parameters for dosage forms.

Learning outcomes:

1- Knowledge:

- a. Define the concepts of bioavailability and bioequivalence.
- b. Describe the mechanisms of drug transport and drug release from dosage forms
- c. List formulation factors affecting oral absorption
- d. Memorize the basic equations used in protein binding and drug dissolution

2- Cognitive Skills:

- a. Explain the relationship among physicochemical and biological factors, dosage forms, routes of administration and therapeutic outcomes
- b. Estimate the absolute and relative drug bioavailability using plasma and urinary data.

- c. Calculation of protein binding parameters
- d. Compare between different dosage forms.
- e. Explain how formulation additives affect drug absorption and drug bioavailability

3- Interpersonal Skills & Responsibility:

- a. Demonstrate understanding of the physiological and biological factors that affect drug absorption
- b.. Illustrate the principles of pharmaceuticals and biopharmaceutics in dosage form design and development.

4- Communication, information Technology, Numerical:

- a. Evaluate biopharmaceutics studies involving drug product equivalency
- b. Calculate slope and intercept by using scientific calculator

5- Psychomotor:

- a. Draw data on semi log and ordinary paper to estimate protein binding parameters.

Course Contents:

- Introduction in Biopharmaceutics
- Rate parameters and physical processes relevant to drug absorption
- Relative & absolute bioavailability
- Supply of the gastrointestinal fluids with drug
- Delivery of the drug to and removal of drug from uptake sites
- physicochemical factors effecting the oral drug absorption
- Dissolution from immediate release tablets
- Dissolution from powders and hard gelatin capsules
- Similarity and dissimilarity factors
- Protein binding and Volume of distribution
- Renal and hepatic clearance
- Modified release drug products, osmotic extended release products. Drug release from matrix, polymeric matrix tablets,

Evaluation methods:

- 10-Periodicals
- 30-(2 Midterm exams)
- 60-Final Exam

Text Book(s):

- L. Shargel and A.B.C. YU, Applied Biopharmaceutics and Pharmacokinetics, Appleton & Lange McGraw-Hill, NY, USA. 5th edition, 2005
- M. Gibaldi, Biopharmaceutics and Clinical pharmacokinetics, Latest edition, Lea and Febiger, Philadelphia, USA. 4th edition, 1991

Course Name: Pharmaceutical	التقنية الحيوية الصيدلانية	إسم
Course Code & No.: 335 PHG	المقرر 335 صيد	رقم
Credits: 2 (2+0+0)	2(2+0+0)	عدد الساعات:
Prerequisite: 324PHG	4 نوي	المتطلب:
Level: 7		المستوى: 7

Course Objectives are to:

1. To describe the current concepts in biochemistry, molecular biology, analytical techniques, drug development, delivery and formulation relevant to the use and development of biotechnology-derived products, including protein and nucleic-based pharmaceuticals.
2. To explain extensively both basic science and applications of biotechnology-produced pharmaceutical, with special emphasis on their clinical use and applications.

Course Learning Outcomes

At the end of the course students will be able to:
knowledge

1. **Record, label, or dispense** (knowledge of how) of rprotein based products.

Cognitive skills

2. **Prepare, explain, and interpret** the clinical applications of biotechnology and biotechnology related products, including biopharmaceutical considerations.
3. **Predict** gene therapy outcomes recombinant vaccine applications and outcomes
4. **Compare** the pharmacokinetic and pharmacodynamic of rpeptides and rproteins drugs with that of other chemical compounds.

Interpersonal Skills & Responsibility (mior)

5. **Judge and justify** responsibly while communicating with healthcare teams on problems and issues related to use of recombinant protein as medicines

Communication, Information Technology, Numerical (Minor)

Illustrate and assess, using computer programs and bioinformatics, structures and functions of complex genetic, genomics, or chemical products produced by biotechnology

Course Contents:

- Overview, Biotechnology
- Background, Cell and Molecular Biology
- Tools for Molecular Analysis
- Cloning, Combining Molecular Tools for Recombinant Product Development
- Production of
Biotech Compounds

- Formulation of Biotech Products including Biopharmaceutical Considerations Genetics in Drug Therapy
- Treatment Options Protein Drug Development Related Products Antibodies, Immunotherapy and Vaccines
- Insulin and Growth Hormones
- The impact of Biotechnology on Drug Discovery

Text Book(s):

Daan J.A. Crommelin and Robert D. Sindelar (editors), Pharmaceutical Biotechnology: An Introduction to Pharmacists and Pharmaceutical Scientists, 1st. edition, 1997. Haiwood Academic Publisher, Amsterdam, the Netherlands.

Rodney J.Y. Ho and Milo Gibaldi, Biotechnology and Biopharmaceuticals: Transforming Proteins and Genes into Drugs, 1st. edition, 2003. John Wiley & Sons, Inc., Hoboken, NJ.

Gary Walsh, Biopharmaceuticals: Biochemistry and Biotechnology, 1st. edition, 2002, John Wiley & Sons, Inc., West Sussex, England, ISBN: 0471977896

Susanna Wu-Pong and Yongyut Rojanasakul (editors), Biopharmaceutical Drug Design and Development, 1st. edition, 1999, Humana Press, Totowa, NJ, ISBN: 089603891x

Additional reading: Suggested:

Pharmaceutical Biotechnology: fundamentals and applications, 3rd edition, Informa Healthcare.

Course Name: Dispensing of Medications	اسم المقرر: تجهيز الوصفات الصيدلانية
Course Code & No.: 337 PHT	رقم المقرر 337 صيد
Credits: 3(2+1+0)	عدد الساعات: 3(2+1+0)
Prerequisite: 323PHT	المتطلب: 323 صيد
Level: 9	المستوى: 9

Course Description (AIM):

In this course, students will apply previously acquired knowledge to the practice of dispensing medications. Comparative evaluation of commonly prescribed and some non-prescribed drugs will be discussed. Different criteria used for selection of drugs and pharmaceutical products will be emphasized. Drug interactions and prescriptions for different groups of patients will be discussed.

Course objectives:

1. Knowledge of medical prescription, drug interactions and drug dispensing in different types of patients.
2. Criteria used for selection of drugs and pharmaceutical products and appropriate recommendations on the use of commonly prescribed pharmaceutical products.
3. Calculations in dispensing of medication.

Learning outcomes

1. Knowledge

Upon successful completion of this course, students will be able to:

- a. Define different types of drug interactions.
- b. List the prescription abbreviations, error-prone abbreviations, Symbols, and Dose Designations.
- c. Outline the appropriate procedure used in dispensing prescribed pharmaceutical products.
- d. Describe the appropriate extemporaneous compounding of Rifampin suspension as a prescribed preparations.

2. Cognitive Skills

Upon successful completion of this course, students will be able to:

- a. Convert the units of Metric System from one to another (e.g. grams to kilograms or vice versa)

3. Interpersonal Skills & Responsibility

Upon successful completion of this course, students will be able to:

- a. Evaluate the components of medical prescription

4. Communication, Information Technology, Numerical

Upon successful completion of this course, students will be able to:

- a. Demonstrate communication skills in patient counselling on how to use medications appropriately.

Course Contents:

1. Apply previously taught knowledge in the practice of dispensing.

2. Reviewing, Understanding and Evaluating Prescription and Medication orders
3. Processing Prescriptions and Patient Counseling
4. Identify Drug interactions (Drug-Drug, Drug-Food,)
5. Learn the different criteria used for selection of drugs and pharmaceutical products.
6. Controlled Medication prescriptions and dispensing
7. Comparative study between prescription of various age groups (Pediatrics, Geriatrics, Pregnancy and Breast Feeding)
8. Identify medication errors (prescription errors and dispensing errors)
9. Learn how to provide the appropriate recommendations on the use of commonly prescribed drugs.
10. Learn how to provide the appropriate recommendations on the use of some non-prescription pharmaceutical products.
11. Appreciate the differences between normal adults and some other groups of patients (e.g. pediatrics) and learn the basic knowledge of prescriptions for such groups.
12. Learn the basic knowledge of pharmacokinetic drug interactions and be able to detect drug interactions in medical prescriptions.
13. Learn how to perform the appropriate extemporaneous compounding of selected commonly prescribed preparations.