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## Course Contents

Course Number	:- 502232
Course Title	:- Anatomy and Physiology II
Pre-req.	:- 502231
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Principles of Anatomy And Physiology <b>By: TORTORA and GRABOWSKI</b> Human Anatomy & Physiology <b>By: E.N. MARIEB</b>

## Description

1. Nervous tissue. ( Cont.)
  - a. Signal transmission; Electrical and Chemical Synapses.
  - b. Neurotransmitters.
  - c. Neural circuits .
  
2. Central and Somatic Nervous System.
  - a. Spinal cord; External and Internal Anatomy.  
-----Protective structures; Meninges, Cerebrospinal fluid.
  - b. Spinal cord Physiology.  
-----Ascending & Descending tracts.  
-----Reflexes; Reflex arcs.
  - c. Spinal Nerves; Branches, Plexuses.
  
3. The brain and Cranial nerves.
  - a. Protective structures; Meninges, CSF, Blood-Brain Barrier.
  - b. Parts of the brain ( Structure & Functions).  
-----Brain stem.  
-----The Cerebellum  
-----The Diencephalon.  
-----The Cerebrum.
  - c. Functional aspects of the Cerebral cortex; Sensory, motor and association areas.
  - d. Cranial nerves.
  
4. The Autonomic Nervous System.
  - a. Comparison of Somatic & Autonomic nervous systems.
  - b. Anatomical components of Sympathetic & Parasympathetic nervous systems.
  - c. Autonomic ganglia.
  - d. ANS Neurotransmitters and receptors.

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5. The Endocrine System.
    - a. Mechanisms of Hormone action.
    - b. Control of Hormone secretion.
    - c. Hypothalamus and Pituitary glands.
    - d. Thyroid, Adrenal, Endocrine Pancreas. (structure & function).
      - Regulation of Glucagon and Insulin secretion.
  
  6. The Cardiovascular System: The Heart, Blood vessels and Hemodynamics.
    - a. Structure and Function of the heart.
      - Coronary circulation.
      - Conduction system of the heart. (structure & function).
    - b. Cardiac Cycle, Heart sounds.
    - c. Cardiac output.
      - Regulation of Stroke Volume and Heart Rate.
    - d. Anatomy and Histology of Blood vessels; Arteries, capillaries, veins.
      - Capillary exchange
      - Hemodynamic factors affecting circulation.
    - e. Physiology of Circulation.
      - Control of Blood Pressure.
      - The role of Cardiovascular centers in The control.
      - Neural and Hormonal regulation of Blood Pressure.
      - Local regulation of Blood Pressure.
    - f. Evaluating circulation; Pulse, Measuring blood pressure.
    - g. Circulatory routes; Systemic circulation, Pulmonary circulation, Hepatic-portal Circulation.
    - h. Functions of Blood.
      - Components of blood.
      - Immunity and Hemostasis.
  
  7. The Respiratory System.
    - a. Anatomy and Histology of Respiratory passages and the lungs.
    - b. Physiology of Respiratory system.
      - Pulmonary ventilation; Pressure changes during ventilation.
      - Pulmonary volumes and capacities
    - c. External and Internal Respiration.
      - Transport of oxygen and carbon dioxide.
    - d. Control of Respiration.
      - Role of the respiratory centers in regulation of respiration.
    - e. Medical terminology and disorders.



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## 8. The Digestive System.

- a. The Processes performed by the system.
- b. Organization and layers of the system.
- c. Digestive organs; Structure and Function.
  - Regulation of Gastric and Intestinal secretion and motility.
  - Regulation of Pancreatic secretion.
  - Mechanical And Chemical digestion in small & large intestine.
  - Absorption in small and large intestine.
- d. Accessory organs of The Digestive System.
  - Liver, Pancreas and Gall bladder, (structure & function).
- e. Metabolism of Food types; CHO, Lipids & PTNs.

## 9. The Urinary System.

- a. Kidneys; Anatomy & Histology.
- b. Renal Physiology; Glomerular filtration, Tubular reabsorption & secretion.
- c. Urinary transportation, storage and elimination. (ureter & bladder).
- d. Evaluation of kidney function; normal and abnormal constituents of urine.
- e. Medical terminology and related disorders.

## 10. The Reproductive Systems.

- a. Male reproductive organs. (structure & function). The cell cycle in the gonads.
- b. Reproductive system ducts.
- c. Accessory sex glands.
- d. Female reproductive organs; structure and function.
- e. Female reproductive cycle.
  - Phases of the cycle.
  - Hormonal regulation of the reproductive cycle.
- f. Related terminology and disorders.

## 11. The special Senses.

- a. The eye and Vision.
- b. The Ear; Hearing and Equilibrium.



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## Course Contents

Course Number	:- 502231
Course Title	:- Anatomy and Physiology I
Pre-req.	:- 105102
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Principles of Anatomy And Physiology <b>By: TORTORA and GRABOWSKI</b> Human Anatomy & Physiology <b>By: E.N. MARIEB</b>

## Description

### **1. Organization of the human body.**

- Introduction: Anatomy & Physiology defined. Levels of structural organization.
- Body functions: Life processes.
- Control of Homeostasis; feedback systems .
- Anatomical & Directional terms: Regional names. Planes & sections.
- Body cavities & Regions.

### **2. Cells**

- Parts of cell: Plasma membrane. Cytosol, Cytoskeleton. Cell organelles.
- Cell junctions.
- Functions: Cell communication. Membrane receptors, Membrane transport. Electrochemical gradient. Permeability.
- Transport Across the Plasma membrane .
- Normal & Abnormal cell division. Related medical terminology.

### **3. Tissues**

- Principal types and their origins .
- Classification of tissues.
- General features of each type .
- Functions of tissue types.
- Membranes of the body.

### **4. Integument**

- Skin: structure.
- Functions: Temperature regulation. Protection. Sensation. Excretion. Role in immunity. Vitamin D formation.
- Accessory organs: structure & function (hair, nail, glands).
- Aging changes.
- Homeostasis
- Related medical terms & common skin disorders.

**5. Skeletal system.**

- a. Structure of bones: Types; morphology & histology
- b. Functions: Support. Protection. Movement. Mineral storage. Blood cell formation.
- c. Ossification, Bone growth: Types; intramembranous, endochondral.
- d. Homeostasis: Bone's role in regulation of mineral balance,
- e. Factors affecting bone growth .

**6. The skeleton**

- a. Skeletal markings
- b. The axial skeleton: Skull, vertebrae, thorax.
- c. The appendicular skeleton: Shoulder & Pelvic girdles. Upper & Lower limbs.
- d. Related medical terminology & disorders.

**7. Articulations**

- a. Classification of joints
  - Structural; fibrous, cartilaginous, synovial
  - Functional; synarthrosis, amphiarthrosis, diarthrosis.
- b. Diarthrosis; Types and movements at freely movable joints.
- c. Related terminology & disorders.
- d. Aging and Joints .

**8. The muscular tissue**

- a. Types; Functions & characteristics of muscle types.
- b. Skeletal muscle structure
- c. Molecular basis of skeletal muscle contraction.
  - Neuromuscular junction
  - Sliding filament theory
  - Energy for contraction
  - Kinds of contraction
- d. Skeletal muscle movements
- e. Naming the skeletal muscles.
- f. Smooth & Cardiac muscles.
- g. Related terminology & common disorders.

**9. Principal skeletal muscles.**

- a. Of the Head & Neck.
- b. Of the trunk.
- c. Of the upper limb.



d. Of the lower limb.

### 10. Nervous tissue

- a. Organization: Central nervous system. Peripheral nervous system. (Somatic & Autonomic).
- b. Structure of the nervous system.
  - Neuroglia
  - Neurons: Grouping of neurons (White Matter, Gray matter).
  - Classification; Structural & Functional classification.
- c. Functions of the Nervous tissue.
  - Electrical signals in Neurons; Ion channels, graded potentials, generation of Action potentials.
  - Propagation of nerve impulse, salutatory conduction, speed of impulse propagation .
  - Synapses .
- d. Regeneration of nervous tissue.



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## Course Contents

Course Number	:- 502431
Course Title	:- Pathophysiology
Pre-req.	:- 502232
Credit Hours	:- 3 hours .
Textbook(s)& Reference(s)	:- Pathophysiology/ Concepts of altered health <b>By: Carol Mattson Porth.</b> Pathophysiology/ Clinical Concepts of Disease Processes <b>By: Sylvia A.Price, Loraine M.Wilson</b> Handbook of Pathophysiology <b>By: Eligabeth Corwin</b>

## Description

### General Pathophysiology

#### **1- Alterations in Cell Function**

- Cell injury and Cell Death
- Cell adaptation, Intracellular accumulation, Cell aging
- Tissue regeneration, Tissue repair & wound healing.

#### **2- Alterations in Cell Differentiation**

- Concepts of cell growth
- Characteristics of benign & Malignant neoplasm
- Carcinogenesis & causes of Cancer
- Tumor cell markers, Tumor growth
- Metastasis

#### **3- Body defenses**

- Mechanisms of infectious diseases
- Acute & chronic inflammation
- Alterations in temperature regulation
- Immune mechanisms & immunodeficiency diseases
- Hypersensitivity reactions

#### **4- Hematologic system**

- Disorders of red blood cells
- Anemias- Polycythemia
- Neutrophil disorders
- Coagulation defects
- Lymphadenopathy, splenomegaly

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## Diseases of Organ systems

### **5- Cardiovascular system**

- Alterations in blood flow
- Thrombus, embolus
- Blood pressure, Hypertension & Hypotension
- Control of cardiac function
- Coronary artery diseases
- Angina, myocardial infarction
- Cardiomyopathies
- Valvular heart diseases
- Shock

### **6- Gastrointestinal system**

- Esophagus and its disorders
- Peptic ulcer and disorders of the stomach
- Disorders of small & large intestine
- The Pancreas & Diabetes Mellitus
- The liver , metabolic function
- Jaundice, cirrhosis, hepatitis
- The gall bladder & biliary tract disorders

### **7- Respiratory disorders**

- Control of respiration & alterations in function
- Respiratory tract infections
- Obstructive airway disorders (asthma)
- Tuberculosis, Cystic fibrosis
- Cancer of the lung

### **8- Control of renal function & disorders of the kidney**

- Alterations in glomerular filtration
- Urinary tract infections
- Glomerulonephritis
- Renal failure
- Lower urinary tract disorders

### **9- Disorders of altered endocrine function**

- Thyroid disorders
- Growth disorders





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## 10- Alteration in function of reproductive system

### 11- Neurologic system disorders

- Seizure disorders
- Head injury & Spinal injury
- Cerebrovascular diseases
- Neurologic diseases with generalize symptomatology



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## Course Contents

Course Number	:- 501573
Course Title	:- Health Education and Infections Disease
Pre-req.	:- Fifth Year .
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Microbiology and infectious Diseases <b>By:- Gabriel Virella</b> Lecture Notes on the Infectious Diseases 1999 <b>By:- Bibhat K. Mandal, Richard T. Mayon-White</b> Principles and Practice of infectious Diseases <b>By- Gerald L. Mandell, et al</b> Tropical Infectious Diseases 1999 <b>By:- Richard L. Guerrant , et al</b>

## Description

The Infectious diseases course is an attempt to provide brief but essential information to the pharmacist about the most important contagious disease specially those due to viral infection like HIV, Hepatitis, or to bacterial infection like Salmonella, food poisoning , the methods of their transmission and prevention , and the new drugs for their treatment .

## Justification:

The pharmacist is one of the health care team personnel, he has a very important role in controlling and preventing such easily transmitted diseases, he has the time and well to educate the community about the best way to lower the cases of infection, a good back ground in this subject is demands , in addition it open a new era for working as an active part in the infectious disease control team and in our efforts to find new effective drugs and new protocol for treatment .

- 1- introduction and terminology
- 2- microbial characters that causes infectious disease
- 3- the mode of their transmission
- 4- microbes that causes infectious disease including their mode of transmission , their preventive measures and the new protocols for their treatment , those includes



- HIV and AIDS
- Hepatitis A , B , C , D , E
- CMV
- Influenza virus
- Encephalopathy viruses ( mad cow disease and others )
- Herpes simplex virus
- Salmonella infection and salmonella food poisoning
  
- Tuberculosis
- Malaria
- Schistosoma
- Cholera
- Newly emerge pathogens



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## Course Contents

Course Number	:- 501571
Course Title	:- Microbiology and Biotechnology
Pre-req.	:- Fifth Year.
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Pharmaceutical Biotechnology <b>Daan Crommelin &amp; Robert Sindelar</b> <b>Publisher : Harwood Academic Publishers</b>

## Description

Pharmaceutical Biotechnology is a science for developing new pharmaceutical products using number of different disciplines such as molecular biology, molecular genetics, biochemistry, immunology, and pharmaceutical sciences. This course should promote and familiarize the student with biotechnology techniques, products and gene manipulation.

### **1. Molecular Biotechnology**

The Cell: Prokaryotic & Eukaryotic Cells

Gene Expression : DNA replication, Transcription & Translation

Recombinant DNA : DNA transfer, DNA Sources, Synthetic DNA, cDNA, DNA Library, Production by Recombinant DNA Technology

Specific DNA Techniques: DNA Sequencing, DNA Hybridization, PCR Technology

Cell Culture s: Cultivation of Microbes, Animal and Plant cell Cultures

### **2. Biophysical & Biochemical Analyses of Recombinant Proteins**

Protein Structure

Protein Folding

Protein Stability

Analytical Techniques: Blotting, Immunoassays, Electrophoresis, Chromatography, Bioassays & Mass Spectrometry.

### **3. Biotechnology Techniques**

Introduction

Polymerase Chain Reaction (PCR)

Genetically Engineered Animals: Transgenic Animals & Knockout Mice

Protein Engineering

Nucleic Acid Technologies

Catalytic Antibodies

Biosensors



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#### 4. Gene Therapy

Ex vivo versus In vivo Gene Therapy  
Potential target Diseases for Gene Therapy  
Gene Transfer Methods: Non-Viral, Recombinant Viruses

#### 5. Insulin

Chemical Description  
Pharmacology  
Clinical & Practical Aspects

#### 6. Interleukins and Interferons

Chemical Description  
Pharmacology  
Clinical & Practical Aspects

#### 7. Vaccines

Immunological Principles  
Conventional  
Modern Technologies

#### 8. Monoclonal Antibody Based Pharmaceuticals

Antibody Structure  
Development  
Assembly and Production

#### 9. Biotechnology Products in the Pipeline

### EXAM AND GRADING SYSTEM

	Percent of T. Grade
FIRST EXAM : TBA	30%
SECOND EXAM : TBA	30%
FINAL EXAM : All Material	40%



## Course Contents

Course Number	:- 502221
Course Title	:- General Microbiology
Pre-req.	:- 105102
Credit Hours	:- 3 hours .
Textbook(s) Reference(s)	:- Microbiology for the Health sciences 4 <sup>th</sup> ed. <b>By: G.R.W. Burton</b> Fundamentals of Microbiology <b>By:I.E.Alcamo</b> <b>Sixth edition , Jones and Bartlett 2001.</b> Brock Biology of Microorganisms <b>By: M. T. Madigan, J. M. Martinko and J. Parker</b> <b>Tenth Edition, Prentice Hall, 2003</b>

## Description

This course aims at introducing the students to the world of microorganisms. Microbial morphology, growth, and physiology will be explored. Microbial control including physical and chemical methods will be considered in detail. The Genetics of microorganisms and its applications will be explained. Lectures will cover the host parasite relationships with special emphasis on parasitic relationships between pathogenic bacteria and humans, mechanisms of bacterial pathogenesis and general host response to bacterial invasion. The final part of the course will be dedicated to investigate the applications of Microbiology in industry including food, medicine and agriculture.

## Practical :-

The course design to introduce student to : procedures and techniques used for studying the morphology, microscopic and macroscopic characters of bacteria, bacterial staining techniques, biochemical activities of microorganism ,motility testing and pure culture technique. The effect of physical and chemical agents on the growth of microorganisms, sterilization methods used and the aseptic technique, methods used for determination of antibiotic sensitivity testing



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## **I-Introduction to Microbiology**

- Scope and history of Microbiology.
- Microbial world an overview
- The structure and morphology of prokaryotes
- Functional anatomy of prokaryotic cell
- Microbial growth
- Microbial nutrition and cultivation.
- Control of Microbial growth
- Antimicrobial agents
- Microbial resistance to antibiotics and biocides
- Microbial Genetics
- Biotechnology and recombinant DNA
- Techniques of genetic engineering
- Host parasite relationship
  - Pathogenic of bacterial infection .
  - Host resistance to infections .
  - Transmission of infection .
- The Immune system
- Mycology
- Applications of Microbiology, Food industry, agriculture  
Pharmaceutics.



## Course Contents

Course Number	:- 501574
Course Title	:- Pharmaceutical Care Practice
Pre-req.	:- Fifth Year.
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Pharmaceutical Care Practice <b>By- R.J.Cipolle, L.M. Strand, P.C. Morley</b> Primary care: Concept, Evaluation and Policy <b>By- B. Starfield</b> Standard of Care <b>By- G.J. Annas</b> Opportunities and responsibilities in Pharmaceutical Care <b>C.D.Helper, L.M. Strand. Am.J.Pharm Ed</b> <b>1990;53( winter suppl.) 75-155</b>

## Description

1. To be able to define the central concepts of pharmaceutical care.
2. To understand the need for pharmaceutical care.
3. To understand the details of how pharmaceutical care is practiced at several sites.
4. To understand the factors that are essential to successfully designing, piloting, implementing, and practicing pharmaceutical care .

### **1-A new Professional Practice .**

- \* Pharmaceutical Care in Context .
  - Access, Cost, and Quality of Health Care .
  - Drug Therapy in Health Care .
  - Approaches to the Management of Drug use .
  - Drug Use Responsibility .
- \* Enter Pharmaceutical Care .
- \* Pharmaceutical Care Defined .
- \* The Philosophy of Pharmaceutical Care.
- \* Caring through A Therapeutic Relationship .
- \* Pharmaceutical Care as primary Health Care .

### **2-Drug-Related Morbidity and Mortality : The Challenge for Pharmaceutical Care.**

- \* A historical Overview of Drug Therapy .
- \* A historical look at Drug-Related Morbidity and Mortality .
- \* Limits of the Evidence .





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### **3-Identifying, Resolving, and Preventing Drugs Therapy problems : the Pharmacist's responsibility .**

- \* Introduction to Drug Therapy problems .
- \* Drug Therapy problems defined.
- \* A Taxonomy for Drug Therapy problems.
- \* Common Drug therapy Problem in Practice.

### **4-The Patient Care Process .**

- \* Description .
- \* The Pharmacist's Workup of drug Therapy .

### **5-Documenting A Practice.**

- \* The Pharmaceutical Care Patient Chart .

### **6-Outcomes of Pharmaceutical Care Practice.**

### **7-Building A successful Practice .**

- \* Preparing to build a practice .
- \* Focusing on the patient .
- \* Focusing on the staff .
- \* Creating an appropriate practice .
- \* Accomplishing Reimbursement .

### **8-A reimbursement System for Pharmaceutical Care .**

- \* A review of services.
- \* The value of cognitive services .
- \* Pharmacist's willingness to provide services .
- \* Payment for cognitive services .
- \* Unresolved issues.

### **9- Preparing the Pharmaceutical Care Practitioner .**

- \* Teaching the practicing pharmacist .
- The pharmaceutical care certificate program .

Accreditation of the practice site .

- \* Teaching the pharmacy student .

Triangles to represent pharmaceutical care practice .

The educational experience : starting with the " big picture " .

Teaching to a specific practice .

Building a new program .



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## Course Contents

Course Number	: - 501101
Course Title	: - First Aid
Pre-req.	: - ---
Credit Hours	: - 3 hours .
Textbook(s) & Reference(s)	: - Essentials of First Aid and CPR <b>By:- National Safety Council</b> The First Aid Manual <b>By:- Doling Kindersley</b> New Practical First Aid By:- Doling Kindersley Advanced Emergency Care, for paramedic practice <b>By:- Shirley A Jones, Al-Weigel, Roger</b> <b>D. White, Norman E. McSwain, Marti Breiter</b> Internet sites

## Description

This course is given to all undergraduate student to explain the importance of First Aid and it's aim in the emergencies, and to let them practice some of the important first aid methods for saving life as CPR, The course includes: What are the characters of the rescuer, how the rescuer can evaluate the patient condition, what first aid should be given first, in order to save life, decrease the damage and accelerate healing .

## course outline :-

### **1- Introduction to first aid**

### **2- First aid terminology**

- a- First aid definition
- b- First aid aims
- c- The rescuer characters
- d- The causes of the accidents
- e- The rescuer responsibilities
- f- Priority of the first aid
- g- Caring for conscious and unconscious

### **3- First Aid technology**

- a- Respiration
- b- The anatomy of the respiratory tract
- c- Respiratory tract accidents
- d- Respiratory failure
- e- Choking , the reasons , the first aid needed



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**4- Cardiovascular system accidents**

- a- Anatomy of the system
- b- Bleeding , why, types, symptoms, it's effects
- c- Clotting mechanism
- d- First aid for external and internal bleedings

**5- Material, drugs, instrument needed for first aid**

- a- Physiological solutions
- b- Antiseptics and disinfectant
- c- First aid box

**6- The skin anatomy and its accident**

**7- Wounds :**

- a- Description , classification and types
- b- Wounds dangerous
- c- Contamination of wounds
- d- First aid for special contaminated wounds as animal bites wounds

**8- Burns**

- a- Definition
- b- Causes of burns
- c- Burn classification and their degree
- d- Symptoms of burns
- e- First aid for different types of burns as heat , chemical sun burns

**9- Skeletal, muscular system**

- a- Anatomy
- b- Fractures , definition, classification and symptoms
- c- First aid for different types of fractures
- d- Muscular damages and the first aid

**10- Nervous system**

- a- Anatomy
- b- Unconscious, causes and the first aid
- c- Fainting, causes and the first aid
- d- Coma , causes, diagnosis, and the first aid

**11- Poisoning**

- a- Definition, causes, types and symptoms of intoxication
- b- Poisoning with animal bites as snakes, spiders
- c- Food poisoning, causes and the first aid
- d- Drug abuse poisoning and the first aid



## **12- First aid in emergencies**

- a- Heart attacks :
  - Angina pectoris
  - Myocardial infraction
  - Heart arrest
- b- Stroke
- c- Epilepsy and convolutions
- d- Asthma
- e- Hyperglycemia and hypoglycemia
- f- Abortion

## **13-War chemical weapons**

- a- Definition , classification and symptoms of exposure
- b- First aid for exposed victim
- c- Methods used for decontamination

## **14-International first aid system**

## **15-Civil defenses**



## Course Contents

Course Number	:- 501321
Course Title	:- Pharmacy Practice, law and Ethics
Pre-req.	:- third year .
Credit Hours	:- 2 Hours .
Textbook(s) & Reference(s)	:- Law and Legislation concerning Pharmacy practice in Jordan 1999 <b>By:- K. Sabarini, S. Al-gamil</b> Law of pharmacy 1974 <b>By:- pharmacy sandigate / Jordan</b> Pharmaceutical practice law No. (34) 1972/ Jordan Special sites on Internet

## Description

- 1 - Understand existing laws and regulations governing and defining the profession of pharmacy.
- 2 - Understand the regulatory process so the pharmacist may effect regulatory and statutory reform, redefine pharmacy profession in era of unprecedented health care change .
- 3 - Understand how to identify and evaluate ethical dilemmas in the delivery of health care .
- 4 - Be aware of the legal and ethical aspects relevant to pharmacy practice.

The course provides an outline of the law that affects the practice of pharmacy in Jordan, with an account of the way in which Jordan pharmacy has developed and maintained its standards of professional conduct .

This will cover the major pieces of Jordanian and Arab legislation of relevance to the practice of pharmacy including the medicines Act 1968 the misuse of drugs Act 1971, poisons Act 1972 ,pharmacy Act 1954 and the Health and Safety at Work etc. Act 1974. The role of the Royal Pharmaceutical Society of Great Britain and the professional responsibilities of pharmacists exemplified by the Code of Ethic's and the Council of the RPSGB will be discussed. This knowledge Relation and professional ethic's will then be integrated with the student's knowledge of the scientific principles of drug use by application to a study of the main ways in which mechanical and related products are supplied from pharmacies.



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## Pharmacy Practice , Law and Ethics

### Course outline

#### A- Pharmacy law

- 1- Pharmacy Practice , Introduction
- 2- Terminology in Pharmacy Practice
  - 2 - 1 - Pharmacy
  - 2 - 2 - Pharmacology
  - 2 - 3 - Pharmaceutics
  - 2 - 4- Pharmacognacy
  - 2 - 5 - Drug
  - 2 - 6 - Pharmacopoeias and Formularies
  - 2 - 7 - Drug Compendia and their Classification
- 3- Some important legislation terminology
- 4- Starting legislation and pharmaceutical law in Jordan law ( history )
- 5- Pharmaceutical practice act
- 6- Pharmacist Licensing system
- 7- Pharmacist examination system
- 8- Trainer and pharmacist assistance act
- 9- Licensing pharmaceutical institution
- 10-Conditions of removing the Licensing
- 11-Community pharmacy: legislation and their characters
- 12-Private pharmacy: legislation and their characters
- 13-Sale promotion of medicinal products
- 14-Sale licensing for non pharmacist
- 15-15- Drug stores : their characters, licensing legislation, their duties
- 16-Pharmaceutical factories: their characters, licensing legislation, their departments ,license personnel working in.
- 17-Misuse of drug act
- 18-Dangerous substances and consumer protection
- 19-The pharmacists ; their duties and rights
- 20-Medical control act : Authorized comity , their duties and licensing registration of new pharmaceutical product act.

#### B - Pharmacy Practice Ethics

- 1 - Code of Ethic for Pharmacists
  - 1 - 1 - Preamble
  - 1 - 2 - Goal I
  - 1 - 3 - Goal II
  - 1 - 4 - Goal III
  - 1 - 5 - Goal IV



- 1 - 6 - Goal V
- 1 - 7 - Goal VI
- 1 - 8 - Goal VII
- 1 - 9 - Goal VIII

2- Code of ethics Listed by the international conference in Sydney / Australia

3 - Clinical cases in Ethics

- 3 - 1 - Case 1
- 3 - 2 - Case 2
- 3 - 3 - Case 3

4 - Principles underlying ethics in medical decision making

- 4 - 1 - Beneficence
- 4 - 2 - Autonomy
- 4 - 3 - Honesty
- 4 - 4 - Informed Consent
- 4 - 5 - Confidentiality
- 4 - 6 - Fidelity

5 - Questions All Patient Should Ask Their Pharmacist  
About it



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### Course Contents

Course Number	:- 501221
Course Title	:- Introduction to Pharmacy
Pre-req.	:- Second Year .
Credit Hours	:- 1 hour .
Textbook(s) & Reference(s)	:- Dispensing of medication <b>By:- Robert E. King</b> Pharmaceutical Calculation 9 <sup>th</sup> ed. 1991 <b>By:- Mitchell J. Stoklosa, Howard C. Ansel</b> Pharmaceutical Practice <b>By: Diane M. Collett and Michael E. Aulton</b> Drugs from beginning till now <b>By: R.R Al- alamy</b>

### Description

The aim of this course is to introduce the student to the pharmacy practice. All pharmaceutical issues is discuss from the beginning of the pharmacy practice till now, the discovery of the medical remedies, manufacturing them, their pharmaceutical dosage forms, and how the drug can reach it's site of action, it open the student mind to understood the prescription, it's characters, the pharmacopoeias, the course help the student to understand the pharmaceutical calculation using different systems as an important part in dispensing .it include a discussion of the pharmacy mission now and in future .

### Course outline

- Introduction
- Drug Terminology
- History to Pharmacy science
- Pharmaceutical specialties ( Topics )
- Prescription & some latin Words & Abbreviations used
- Pharmacopoeias
- Weights , Measurements , units & Calculations
- Clinical Pharmacy
- Industrial Pharmacy
- Bioavailability of Drugs
- Factors which affect drug bioavailability
  - Drug Absorption
  - Drug Binding
  - Drug Metabolism.
  - Drug excretion





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- Drug Information Centers
  - Poison Information Centers
  - New Administration Methods
  - Long Acting Drugs
  - Drug now
  - Genetic Engineering
  - Pharmacy in 2000.
- Future of Pharmacy & Pharmacist



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## Course Contents

Course Number	:- 501413
Course Title	:- Instrumental analysis
Pre-req.	:- 101241
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Textbook of Pharmaceutical Analysis Isolation & Identification of Drugs Spectroscopic Methods in Organic Chemistry Pharmaceutical Calculations

## Description

Course Objectives: After completion of this course, the student should be able to:

- 1) Differentiate between quantitative and qualitative analysis.
- 2) Understand the applications and the use of instrumental techniques in purity analysis, assay methodology and structural elucidation .

## First Part : Theory

### (1) U.V spectroscopy

- Sensitivity of the analytical techniques
- Electromagnetic radiation
- Basic design of UV spectroscopy
- Basic principle of light absorption by molecules
- Beers Lambert Law
- Deviation from Beers Lambert Law

#### Instrumental factors

Use of polychromatic radiation

Stray light

Indeterminate Instrumental variations

#### Chemical factors

Possibility of Interaction

Dissociation

Temperature Effect

Light Effect

#### Photometric Errors

\*Applications in pharmaceutical Industry



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**(2) Fluorimetry**

Basic principle & instrumentation  
Factors affecting Fluorescence  
Applications in pharmaceutical Industry

**(3) Infra red**

Basic principle & instrumentation  
Applications in pharmaceutical Industry

**(4) Mass Spectroscopy**

Basic principle & instrumentation

**(5) Nuclear Magnetic Resonance Spectroscopy**

Basic principle & instrumentation

**(6) High Performance Liquid Chromatography**

Basic principle & instrumentation  
Applications in pharmaceutical Industry

**Assessment:**

Students have to submit three exams during the semester which includes:  
first 15% , second 15%, final 50%,  
and the practical exam 20%, a total of 100 %.



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## Course Contents

Course Number	: - 501565
Course Title	: - Advanced Instrumental Analysis .
Pre-req.	: - Fifth Year .
Credit Hours	: - 3 hours .
Textbook(s) & Reference(s)	: - Textbook of Pharmaceutical Analysis Pharmaceutical Calculations

## Description

- 1- Introduction to instrumental techniques used in quantitative pharmaceutical analysis .
- 2- The mechanism of loading of some polymers using propranolol as a model drug substance .
- 1- Studying the release of the drug from the polymer by using a continuous flow cell .
- 2- Introduction to chromatography .
- 3- Application of H.P.L.C for the determination of active ingredients in :-
  - a- Pharmaceutical dosage form .
  - b- Biological fluids .
- 4- Introduction to (DSC) .
- 5- The use of DSC in purity analysis .
- 6- The use of DSC in determination of polymorphs .
- 7- Presentation .

The student will present in twenty min. a work about a drug product already published in the literature .



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## Course Contents

Course Number	: - 501421
Course Title	: - Industrial Pharmacy .
Pre-req.	: - 501441
Credit Hours	: - 4 hours .
Textbook(s) & Reference(s)	: - Theory and practice of industrial pharmacy. <b>By: Lachman .</b> -Pharmaceutics. The Science of Dosage Form Design . <b>By: Aulton</b> - Remington Pharmaceutical Sciences .

## Description

### **This Course includes :-**

- \* Preformulation (physico-chemical properties of drug substances and drug substance-additives incompatibility ).
- \* Principles of Pharmaceutical Processing (Mixing, Milling, Drying, Granulation, Particle size analysis) .
- \* Formulation and Evaluation of Dosage Forms (Tablets Capsules, Microencapsulation, Sustained- Release Products and their compendial and non-compendial specifications).
- \* Coating technology.
- \* Introduction to Good Manufacturing Practice (GMP) .



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## Course Contents

Course Number	:- 501572
Course Title	:- Advanced Industrial Pharmacy .
Pre-req.	:- Fifth Year.
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Pharmaceutical Dosage Forms and - Drug Delivery systems. <b>By: Ansel &amp; others</b> Novel Drug Delivery systems. <b>By: Y.W. Chien .</b> - Remington Pharmaceutical Sciences .

## Description

This course covers the organization structure of pharmaceutical manufacturing companies, duties and responsibilities of various departments, such as, research & development, production, quality affairs and marketing. The course also covers the stages of new drug development and approval process by FDA. In addition, it includes the design and development of various dosage forms, advanced drug delivery systems and packaging of these dosage forms .



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## Course Contents

Course Number	: - 501569
Course Title	: - Cosmetics
Pre-req.	: - Fifth Year
Credit Hours	: - 3 hours .
Textbook(s) & Reference(s)	: - Harry's Cosmeticology <b>By: Wilkinson &amp; Moore .</b> - The ABC's of Cosmetics . <b>By: C.Predeteanu</b>

## Description

The course includes Relation between cosmetics and therapy, Causes and symptomatology of skin diseases, Forms of cosmetics preparations, Percutaneous absorption, Dentifrices, Shampoos, Deodorants and anti-perspirant preparations, Mouthwashes. Preparations with protective action against organic solutions and solvents. Preparations with protective action against UV radiations, Evaluation of sunburn preventives. Preparations with protective action against mechanical stress, Body and Baby preparations, Insect-repellent preparations, Decorative preparations .



## Course Contents

Course Number	:- 501411
Course Title	:- Chemotherapy
Pre-req.	:- 501451
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- J. of Cancer research Anticancer drugs <b>By: William B. Pratt &amp; Rymond W.Ruddon</b> Cancer chemotherapy <b>By: F.M.Muggia et.al. Ed. S.Greenwald, MD.</b>

## Description

### 9) Cancer

- 1- introduction and terminology .
- 2- occurrence .
- 3- metastases .
- 4- cell growth cycles .
- 5- cell repair mechanism .
- 6- the protein machinery of the cell cycle and causes of cancer .
- 7- cyclins as oncogene candidate .
- 8- new tumor suppressor candidate .
- 9- the role of cell membrane on mutual recognition of cell and its relation to cancer .
- 10-mechanisms of tumor formation (mutation, addition of new genetic material, changes in gene expression, chemicals ) .

### B)Treatment of Cancer

- a- surgery .
- b- photoradiation therapy (photodynamic therapy).
- c- radiation therapy .
- d- immunotherapy .
- e- chemotherapy .
  - 1- limitation .
  - 2- achievements .
  - 3- combination therapy .
  - 4- adjuvant therapy .
  - 5- drug resistance (MDR and others) .
  - 6- toxicity of antineoplastic agents and contraindication.
  - 7- guide line on cytotoxic drugs handling .
  - 8- side effects of cytotoxic drugs .





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### C) Antineoplastic drugs

#### 1- alkylating agents

- i-  $\beta$ -haloalkylamines of different structures and pharmacokinetic properties, mechanism of action .
- ii- nitrosourea, mechanism of action and pharmacological properties, various structural formulae.
- iii- cyclophosphamide, activation and mechanism of action .
- iv- carbinolamines, busulfans, character and mechanisms of action .
- v- mitomycin mechanism of action and their specific chemical structure.
- vi- procarbrazine & dacarbazine, mechanism of action, specific properties, advantages .
- vii- other alkylating agents such as thioterpa, erythritol-anhydride, mitobromitol and others .
- viii- organometallic compounds, cis-platin, carboplatin, DACH.

### D) Antimetabolites :

- a- purine antagonists .
- b- pyrimidine antagonists .
- c- folic acid antagonists .

The discussion involve mechanisms of actions, bioactivation, advantages, limitation aspect to be consider with each of these antimetablites .

### E) Antibiotics

- anthracyclines (i.e. doxorubicin, dactinomycin, daunorubicin, mitoxantrone, belomycin and others )
- i- mechanism of action .
- ii- free radical cytotoxicity .
- iii- advantages & limitations .

### F) Plants products

- i- vinca alkaloids mechanism of action, structural aspect .
- ii- taxol, mechanism of action, and the differences between taxol & vinca alkaloids.
- iii- resins such as Teniposide, Irinotecan and others.

### G) Hormones and antagonists

- i- hormonal antagonists .
  - a- antiestrogens and anti-HER2 (Her ceptin) .
  - b- non-sterodial aromatase inhibitors .



- c- new steroidal aromatase inhibitors .
- d- for male (androgen inhibitors ) non steroidal and steroidal compounds), also  $\alpha$ - reductase inhibitors.

H) Angiogenesis inhibitors Angiostatin and Endostatin and others .

I) Kinase inhibitors (cyclin dependent kinase inhibitors, (flavopiridol and others).

J) Proteases inhibitors (Nafamostat and others ) .

### **10) Antibiotics**

1- Historical background, current status, commercial production, spectrum of activity .

#### **Chemical classification :-**

##### **1- $\beta$ -lactam,**

- i- five membered ring system penam, penem, carbapenem, clavam, azetidine –2-one (mono- $\beta$ -lactam) .
  - a- mode of action and antimicrobial spectrum .
  - b- allergic reactions .
  - c- resistance .
  - d- chemistry, nomenclature, stereochemistry and stability .
  - e- structure activity relationships (SAR) .
  - f- products & their spectrum of activity due to SAR .

ii- cephalosporins – (sixmembered ring system)

- a- introduction .
- b- antimicrobial action of cephalosporins .
  - i- 1<sup>st</sup> generation .
  - ii- 2<sup>nd</sup> generation .
  - iii- 3<sup>rd</sup> generation .
  - iv- 4<sup>th</sup> generation .
- c- SAR notes for each generation .
- d- products and their specific chemistry, spectrum of activity and therapeutic application .
- e- structural stability .
- f- light inactivated cephalosporine .

##### **2- tetracyclines**

- a- introduction .
- b- chemistry & stability under acidic and basic condition.



- c- mechanisms of action .
- d- structure activity relationships, (SAR) .
- e- products: chemical specificity, therapeutic application & physical and chemical properties .

### **3- aminoglycosides**

- a- structural consideration-chemistry .
- b- spectrum of activity – various aminoglycosides .
- c- mechanism of action .
- d- drug resistance .

### **4- macrolides**

- a- chemistry .
- b- mode of action.
- c- resistance, novel approach to overcome resistance .
- d- structural modifications to overcome structural instability (Roxithromycin, Dirithromycin, azithromycin, clarithromycin, flurithromycin).

### **5- miscellaneous**

- Lincomycin
- Novobiocin .
- Spectinomycin .
- Chlormphenicol, others .

## **11) Quinolones and analogous**

- 1- spectrum of antibacterial activity .
- 2- various chemical classes, (quinolones, Naphthyridine, cinnolone, pyridopyrimidine) .
- 3- mechanism of action .
- 4- SAR for fluoroquinolones .
- 5- resistant .

## **12) Antiviral agents**

- 1- introduction .
- 2- structural characteristics of viruses .
- 3- specific targets for antiviral agents .
- 4- classification of antiviral agents .



**a- DNA virus .**

- i- 5- substituted –2- deoxyuridines (cyclic nucleosides)
- ii- arabinonucleosides .
- iii- acyclic nucleosides .
- iv- non-nucleosides .

**b- RNA viruses .**

- i- a cyclic and carbocyclic adenosine analogues.
- ii-azole ribonucleosides .
- iii- dideoxy nucleosides .
- iv- adamantanes .
- v- protease inhibitors



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## Course Contents

Course Number	: - 501521
Course Title	: - Therapeutics
Pre-req.	: - 501451
Credit Hours	: - 4 hours .
Textbook(s) & Reference(s)	: - Clinical Pharmacology <b>By: Laurance and Bennett</b> The Pharmacological Basis of <b>Therapeutics</b> <b>By: Goodman and Gilman .</b> Basic and Clinical Pharmacology, Pharmacology <b>By: Katzung</b>

## Description

### **1. General Principles**

What is therapeutics, iatrogenic disease, drug-induced injury, Prescribing drugs, Compliance and self-medication, Therapeutic trials. Ethics of research in man.

### **2. Drug Interactions**

Individual and Biological variations, Importance of drug interactions, Pharmacological basis of drug interactions, Types of drug interactions.

### **3. Hypertension.**

Control of Arterial Blood Pressure, Types of Hypertension, Management strategies, Non-drug considerations, Use of antihypertensive medication, Diuretics, Vasodilators, adrenoceptor blocking agents, Centrally acting drugs, ACE inhibitors, Calcium channel blockers. Interactions.

### **4. Angina Pectoris**

Types of Angina, Management strategies, Drugs in angina, Diuretics, Vasodilators, Calcium channel blockers, ACE inhibitors. Interactions.



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**5. Congestive Heart Failure.**

Definition of congestive heart failure. Pathophysiology, objectives of treatment, classification of drugs, management of cardiac failure, Prognosis.

**6. Bronchial Asthma.**

Pathophysiology, Types of Asthma, Management strategies, Drug treatment, Status asthmaticus, Chronic obstructive pulmonary Disease.

**7. Clinical use of Antibiotics.**

Approaches to Antimicrobial Therapy, Therapy of Established infections, Monitoring Therapeutic response, Antimicrobial combinations, Prophylaxis,

**8. Oral Contraceptives**

Gonadal hormones. Oral, parenteral and implanted contraceptives, Use and adverse reactions, Contraception in Men.

**9. Central nervous system disorders.**

Parkinsonism, Epilepsy and Psychosis. Pathophysiology of CNS disorders, Management strategies, Drugs used in treatment of CNS disorders, Types of Epilepsy, Drug monitoring in CNS disease. Prognosis.

**10. Diabetes Mellitus**

Types and etiology, Diabetes and Insulin, Types of Insulins, Oral antidiabetes drugs, Treatment of Diabetes, New approaches, Diabetic ketoacidosis.



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## Course Contents

Course Number	: - 501560
Course Title	: - Selected Topics in Pharmacology.
Pre-req.	: - Fifth Year .
Credit Hours	: - 3 hours .
Textbook(s) & Reference(s)	: - Basic and Clinical Pharmacology, B. Katzung. The Pharmacological Basis of Therapeutics, Goodman and Gilman. Pharmacology, Rang, Dale and Ritter

## Description

### **1. Basic and Clinical Evaluation of Drugs**

Drug discovery, Preclinical safety and Toxicity studies, Evaluation in Humans, Case Studies.

### **2. Vasoactive Peptides**

Angiotensin and inhibitors, Kinins and drugs affecting the Kallikrein – kinin system, Vasopressin, Natriuretic peptides, Endothelins, Vasoactive intestinal peptides, Substance P.

### **3. Pharmacogenetics**

Drug biotransformation, Genetic factors affecting drug metabolism, The cytochrome P450 system, Enzyme induction, Enzyme inhibition, Clinical relevance of Drug metabolism.

### **4. Gene Therapy.**

Definitions, Techniques used in Gene therapy, Therapeutic applications of Gene therapy, Drug delivery and complications.

### **5. Dermatologic Pharmacology.**

Dermatologic basis for topical drugs, Antibacterial agents, Antifungal agents, Drugs for pigmentation, Sunscreens, Drugs for Acne and Psoriasis, Topical Anti-inflammatory drugs,



## **6. Nitric Oxide, a Neurotransmitter.**

Discovery of Nitric oxide in the body, Synthesis and inactivation mechanisms, Physiological and Pharmacological effects of Nitric oxide, Possible role in etiology of cardiovascular and other diseases.

## **7. Perinataal and pediatric Pharmacology.**

Drugs in Pregnancy, Teratogenic effects of drugs, Drug therapy in infants and Children, Dosage forms and compliance, Drugs during Lactation.

## **8. Geriatric Pharmacology.**

Effect of Aging on physiological and pharmacological parameters, Effects of major drugs on various body organs in the elderly, Adverse reactions in the Elderly, Aspects of drug management in the elderly.

## **9. Immunopharmacology.**

Elements of the immune system, Immunosuppressive agents, Immunomodulating agents, Immunologic reactions to drugs,





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## **Course Contents**

Course Number	: - 501563
Course Title	: - Quality Assurance
Pre-req.	: - Fifth Year .
Credit Hours	: - 3 hours .
Textbook(s) & Reference(s)	: - USP . The orange Book, UK.

## **Description**

- Introduction
- Definitions, Good Manufacturing Practice (GMP).
- Pharmaceutical Industry, GMP and the law, Documentation, Labels.
- Cleanliness, Cross contamination, avoiding contamination
- Packaging.
- What is Quality, Relationship to GMP.
- Elements of Quality Control, Personnel
- Instruments, Premises, Water
- Chemicals and Procedures.
- Quality Assurance, Definitions
- Functions of a Quality Assurance Unit, Documentation system
- Auditing checklists, Raw material control, in-process control
- Corrective actions, Production cleaning, processing and documentation
- Product Quality, Training and Health.



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## Course Contents

Course Number	: - 501441
Course Title	: - Pharmaceutics (3)
Pre-req.	: - 501342
Credit Hours	: - 3 hours .
Textbook(s) & Reference(s)	: - Hand Book of non prescription Drugs (latest available edition, edited <b>By: American Pharmaceutical Association</b> OTC Medications, Symptoms and Treatment of common illnesses (Second edition, edited <b>By: A. Liwan Po. And G. Liwan Po.,</b> <b>Blackwey Science)</b> . Non prescription Medicines (First edition, <b>By : Alan Nathan, Pharmaceutical Press)</b>

## Description

- 1- Introduction to Non prescription Drugs .
- 2- Acid-Peptic Disorders and Intestinal Gas .
- 3- Constipation .
- 4- Diarrhoea .
- 5- Nausea and vomiting .
- 6- Anorectal Disorders (Hemorrhoids) .
- 7- Poisoning .
- 8- Headache and Muscle Pain .
- 9- Common cold .
- 10- Allergic Rhinitis .
- 11- Ophthalmic Disorders .
- 12- Contact Lens Products .
- 13- Infant Nutrition and special nutritional needs .
- 14- Vaginal and Vulvovaginal Disorders .



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## Course Contents

Course Number	: - 501453
Course Title	: - Clinical Nutrition
Pre-req.	: - 502212
Credit Hours	: - 3 hours .
Textbook(s) & Reference(s)	: - Contemporary Nutrition Issues and Insights <b>By: G. M. Wardlaw</b> <b>P. M. Insel</b> <b>M. F. Seyler</b> Essentials of Nutrition and Diet Therapy <b>By: S. R. Williams</b> Human Nutrition and Dietetics <b>By: R. Passmore</b> <b>M. A. Eastwood</b> Nutrition Concepts and Controversies <b>By: F. Sizer and</b> <b>E. Whitney</b>

## Description

### 1. Introduction

- 1.1 Define Nutrition and be Familiar with Nutritional Terminology
- 1.2 Define the Recommended Dietary Allowances (RDAs)
- 1.3 Identify Food Guide Pyramid
- 1.4 Review the main Components that Make up the Backbone of Nutrition  
→ such as Proteins, Carbohydrates, Lipids, Vitamins, Minerals and Water  
→ Identify the Role of Pharmacist in the Field of Human Nutrition

### 2. Nutritional Aspects of Carbohydrates

- 2.1. Sugars, Starch, Glycogen, and Fibers
- 2.2. Define Dietary Fibers and Explain the Clinical Effects of dietary Fiber in Disease State such as Diabetes Mellitus and Colon Cancer

### 3. Nutritional Aspects of Lipids

- 3.1. Fats, Oils, Phospholipids, and Sterols
- 3.2. Heart Disease
  - Atherosclerosis
  - Risk Factors
  - Diet Therapy
  - Drug Treatment



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#### **4. Nutritional Aspects of Proteins and Amino Acids**

- 4.1. The roles of Proteins in the Body
- 4.2. Food Proteins: Quality use, and Need
- 4.3. Protein Deficiency and Excess

#### **5. Vitamins**

- 5.1. Identify the Fat-Soluble and Water-Soluble Vitamins.
- 5.2. List the Functions, Pharmaceutical Uses and Selected Toxicities of Fat-Soluble and Water-Soluble Vitamins

#### **6. Water and Minerals**

- 6.1. Compare the Minerals in Terms of Physiologic Functions of each and Major Clinical Problems Created by Deficiency or Excess Intake
- 6.2. Explain the Fluids-Electrolytes Balance.
- 6.3. Describe the Electrolyte Composition of Body Fluid Compartments
- 6.4. Explain the Acid-Base Balance.

#### **7. Life Cycle Nutrition: Mother and Infant**

- 7.1. Pregnancy: The Impact of Nutrition on the Future
- 7.2. Fetal Growth and Development
- 7.3. Nutrient Needs
  - Energy
  - Protein
  - Vitamins and Minerals
- 7.4. Dietary Problems
  - Nausea and Vomiting
  - Heartburn
  - Constipation
  - Hemorrhoids
- 7.5. Pregnancy Complications:
  - Anemia
  - Toxemia
  - Hypertension
  - Diabetes Mellitis
- 7.6. Physical Activity
- 7.7. Teen Pregnancy

#### **8. Lactation**

- 8.1. Nutritional Risk Factors
- 8.2. Nutrient Needs
- 8.3. Special Consideration
  - Excessive Restriction of Foods



- Vegetarianism
- Obesity
- Alcohol
- Caffeine
- 8.4. Advantages – Mother
- 8.5. Advantages – Infants
- 8.6. Breast Milk
  - Nutrient Needs
  - When not to Breastfeed
  - Feeding the Infant
  - Nutrient Needs

## **9. Child, Teen, and Older Adults**

- 9.1. Growth and Nutrient Needs of Young Children
- 9.2. Nutrient Deficiencies and Behavior
- 9.3. The Teen Years
- 9.4. Growth and Nutrient Needs of Teenagers
- 9.5. Eating Disorders:
  - Anorexia Nervosa
  - Bulimia
  - Development
  - Treatment

## **10. Aging**

- 10.1. Nutrition and Longevity
- 10.2. Nutrition in the Later Years
- 10.3. Alzheimer's Disease - Senile Dementia
- 10.4. Food Choices of Older Adults
- 10.5. Energy Balance and Weight Control

## **11. Nutrition: Athletics and Fitness**

- 11.1. Basic Goals of Nutrition in an Athlete
- 11.2. Energy Sources for Physical Activity
- 11.3. Exercise Fitness
  - Heart Disease
  - Diabetes
  - Obesity
  - Osteoporosis
- 11.4. Nutrient Needs
- 11.5. Role of the Pharmacist
- 11.6. Use of Energy Sources During Physical Activity



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11.7.Diet During Training

- Basic Diet
- Carbohydrates
- Protein
- Fat
- Water and Electrolytes

11.8.Nutrition After Competition

**12.Administering Medications Via Feeding Tube**

- 12.1.Types of Feeding Tubes
- 12.2.What Types of Medications may be Given through Feeding Tube
- 12.3.Problems with Administering Medications via Feeding Tube
- 12.4.Procedure for Administering Medications via Feeding Tube

**13.Nutrition and Disease Prevention**

- 13.1.Nutrition and Immunity
- 13.2.Nutrition and Atherosclerosis
- 13.3.Nutrition and Hypertension
- 13.4.Nutrition and Cancer
- 13.5.Diet as Preventive Medicine

**14.Special Clinical Situations**

- 14.1.Liver Disease:
- 14.2.Renal Disease
- 14.3.Chronic Pulmonary Disease
- 14.4.Pancreatitis



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## Course Contents

Course Number	:- 502342
Course Title	:- Parasitology
Pre-req.	:- 502221
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Clinical Parasitology <b>P. C. Beaver, R. C. Jung and E. W. Cupp</b> <b>Latest edition, Lea and Febiger</b> Pharmaceutical Microbiology <b>W. B. Hugo and A.D.Russell.</b> <b>Latest edition, Blackwell Sc. Pub</b> Disinfection, Sterilization and Preservation <b>R. S. Block Lea and Febiger</b> Bentley's T.B. of Pharmaceutics <b>E.A.Rawlins E.L.B.S. and Bailliere Tindall</b>

## Description

This course is divided into two parts :-

- (A) Parasitology
- (B) Pharmaceutical microbiology:

### A-Parasitology

This part will introduce the students to the human parasites, their morphology, life cycle, mode of transmission and pathogenesis. Parasitic diseases and their treatment will be covered. Lectures will also cover the immune system and its defense against various parasites. Lab sessions will involve characterization and identification of unicellular and multicellular parasites.

### B-Pharmaceutical Microbiology

This part of the course will provide the student with the essential and basic information related to pharmaceutical microbiology, which will help the student in his future career as a community, hospital or industrial pharmacist.



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## A-Parasitology

The following topics will be covered:

- General definitions of terms
- Pathogenesis of parasitic diseases
- Protozoa and Protozoan diseases:
  - Amoeba
  - Flagellates
  - Ciliates
  - Apicomplexae
  
- **Multicellular Parasites and diseases caused by them:**
  - Flat worms (Trematodes)
    - Blood flukes
    - Liver flukes
    - Intestinal flukes
  
  - **Cestodes**
    - Teania sp.
    - Diphylobothrium latum
    - Echinococcus granulosus
  
  - **Round worms**
    - Intestinal Nematodes .
    - Blood and tissue dwelling Nematodes .

## B-Pharmaceutical Microbiology

The following topics will be covered

- **Disinfection and antisepsis**
  - Mode of action of disinfectants
  - Dynamics of disinfectants
  - Factors affecting activity of disinfectants
  - Evaluation of disinfectants and antiseptics.
- **Microbial Contamination and spoilage of pharmaceutical products**
  - Introduction
  - Spoilage of Pharmaceutical products
  - Signs of spoilage
  - Consequences of using spoiled products.





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- **Control of Microbial contamination and spoilage**
    - Preservation of pharmaceutical products
      - Preservatives commonly used in pharmacy
      - Factors influencing preservation
      - Determination of preservative efficacy
  
  - **Sterilization**
    - Introduction
    - Dynamics of microbial kill process
    - Sterilization methods, instruments and operation
    - Sterilization control and sterility testing
    - Sterile pharmaceutical products
  
  - **Asepsis area and aseptic processing**
    - Definitions
    - The need for aseptic techniques and asepsis area
    - Features of asepsis area, design, facilities and control
  
  - **Employing Microorganisms in assays**
    - Antibiotic assay



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## Course Contents

Course Number	:- 502341
Course Title	:- Immunology and Virology
Pre-req.	:- 502221
Credit Hours	:- 2 hours .
Textbook(s) & Reference(s)	:- Immunology for Medical Students, 2002 <b>Roderick Nairn &amp; Matthew Helbert</b> <b>Publisher: Mosby</b> Medical Microbiology and Immunology, 3rd ed., 1994 <b>Warren E. Levinson and Ernest Jawetz</b> <b>Publisher : Appleton and Lange</b>

## Description

This course enables the students to understand the basic concepts and components of the immune system, antigens recognition molecules, physiology of the immune system, innate immunity, and immune system in health and disease. The second part includes introduction to viruses, classification, and viruses that cause disease to humans such as herpes viruses, hepatitis viruses (A to G), HIV, tumor viruses and others.

## Lectures Outline

Immunology

### Section I

#### Introduction

1. Basic concepts and components of the immune system
2. Basic components

### Section II

#### Antigen-recognition molecules

3. Introduction to antigens and recognition
4. Antigens and antibody structure
5. Antibody-antigen interaction
6. Antibody diversity
7. The T cell receptor
8. Major histocompatibility complex
9. Review of antigen recognition



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### **Section III**

#### **Physiology**

10. Antigen processing and presentation
11. Lymphocyte activation
12. Haematopoiesis
13. The organs and tissue of the immune system
14. B cell development
15. T cell development
16. Cell-cell interaction in generating effector lymphocytes
17. Immunological memory
18. Review of immune physiology

### **Section IV**

#### **Innate immunity**

19. Constitutive defenses including complement
20. Phagocytes
21. Killing in the immune system
22. Inflammation
23. Review of innate immunity

### **Section V**

#### **Immune system in health and disease**

24. Infections and vaccines
25. Hypersensitivity reactions
26. Immediate hypersensitivity (type I): allergy
27. Autoimmunity
28. Antibody-mediated hypersensitivity (type II)
29. Immune complex disease (type III hypersensitivity)
30. Delayed hypersensitivity (type IV)
31. Primary immunodeficiency
32. Secondary immunodeficiency
33. Transplantation
34. Tumor immunology
35. Integration of the immune system with other regulatory systems
36. Review of immunity in health and disease



## **Virology**

1. Introduction to Virology.
2. Classification of Viruses.
3. Herpes Viruses I, II, III, EBV and CMV.
4. Measles, Mumps, & Rubella.
5. Hepatitis Viruses A, B, C, D, E.
6. Human Immunodeficiency Virus (HIV).
7. Tumor viruses, HPV, HTLV-1, EBV,..etc
8. Other viruses e.g. Ebola, Hantaan,... etc.

## **EXAM AND GRADING SYSTEM**

FIRST EXAM : TBA  
SECOND EXAM : TBA  
FINAL EXAM : All Material.

Percent of T. Grade  
30%  
30%  
40%



## Course Contents

Course Number	:- 502314
Course Title	:- Clinical Biochemistry
Pre-req.	:- 502212
Credit Hours	:- 2 hours .
Textbook(s) & Reference(s)	:- Clinical Biochemistry: An Illustrated Colour Text , 2ed., 1999 <b>Allan Gaw, Robert Cowan et al.</b> <b>Publisher : Churchill Livingstone</b>

## Description

### Lectures Outline

1. **Introduction to Clinical Biochemistry:** Clinical Lab., Specimens, Interpretation of Results, Reference Range, Precision, Accuracy, Sensitivity, Specificity, & Quality Control
2. **Fluid and Electrolyte Balance:** Extracellular and Intracellular Fluids, Sodium, Potassium, Chloride in health and disease, Osmolality
3. **Acid-Base Balance:** Buffers of Blood, Blood Gases in health and disease
4. **Kidneys and Renal disorders**
5. **Plasma Proteins:** In health and disease
6. **Enzymes:** In health and Disease
7. **Liver:** Liver Function Tests and Liver Diseases
8. **Glucose Metabolism:** Diabetes Mellitus and Hypoglycemia
9. **Lipids Metabolism:** Hyperlipidemia
10. **Mineral and Trace Elements:** Calcium, Phosphates, Magnesium, Iron, Copper, Zinc in health and disease
11. **Hormones and Endocrine System:** Hypothalamus, Pituitary, Thyroid, Adrenal, Gonads in health and disease



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**12. Therapeutic Drug Monitoring****13. Specialized Investigations:**

Tumor Markers, Fetal and Prenatal testing, DNA testing, Inherited Disorders, Screening for newborns, and others.

**EXAM AND GRADING SYSTEM**

	<b>Percent of T. Grade</b>
FIRST EXAM :TBA	30%
SECOND EXAM : TBA	30%
FINAL EXAM : All Material	40%



## Course Contents

Course Number	:- 501313
Course Title	:- Phytochemistry
Pre-req.	:- 501251
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Trease and Evans (Pharmacognosy <b>15 Ed</b> ). Bruneton (Pharmacognosy, phytochemistry, Herbal drugs <b>2 Ed</b> ).

## Description

Secondary plant metabolites

### **1-Terpenoids and Steroids**

Mevalonate pathway (origin of C5-units), Monoterpenes (incl. terpenoids), sesquiterpenes, essential oils, Sesquiterpenoid lactones, diterpenes, saponins (extraction, characterization, and quantitation, biological and pharmacological properties), cardiac glycosides (extraction, characterization, quantitation).

### **2-Polyacetates**

Polyketide pathway, Quinones, Anthraquinones (structure, extraction, separation, characterization, biological properties, Borntraeger reaction, analysis), Naphthodianthrones, orcinols and phloroglucinols.

### **3-Shikimates**

Shikimate pathway, Phenyl propane derivatives, Phenols, phenolic carboxylic acids, Coumarins, Lignans, Chromones, Flavonoids, tannins.

### **4-Alkaloids**

Alkaloids derived from ornithine and lysine, tropane alkaloids, Alkaloids derived from phenyl alanine and Tyrosine, phenyl ethyl amines, isoquinoline alkaloids, alkaloids derived from Tryptophan, monoterpene indole alkaloids (incl. Ergot alkaloids).

### **5-Vitamins**

Vitamin A, Vitamin C, Vitamin K, Vitamin E, Vitamin D.



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## Course Contents

Course Number	:- 501251
Course Title	:- Pharmacognosy
Pre-req.	:- 105102
Credit Hours	:- 4 hours .
Textbook(s) & Reference(s)	:- Trease and Evans (Pharmacognosy <b>15 Ed</b> ). Bruneton (Pharmacognosy , phytochemistry, Herbal drugs <b>2 Ed</b> ).

## Description

### **-A-Leaves and Herbs**

- (1) Eucalyptus leaf.
- (2) Rosmary leaf.
- (3) Balm leaf.
- (4- Red sage.
- (5) Greek sage.
- (6) Peppermint leaf.
- (7) Thyme herb.
- (8) Spearmint leaf.
- (9) Senna leaf.
- (10) Foxglove leaves.
- (11) Jaborandi leaf.
- (12) Common perwinkle herb.
- (13) Coca leaf.
- (14) Black tea leaf.
- (15) Ephedra herb.
- (16) Artemesia leaf.
- (17) Taxus baccata leaf.
- (18) Tabacco leaf.
- (19) Feverfew leaf.
- (20) Khat leaf.
- (21) Belladonna leaves
- (22) Stramonium leaf.
- (23) Madagascan periwinkle leaf.

### **-B-Fruits, seeds**

- (1) Cayenne pepper (capsicum) fruits.
- (2) Black pepper fruits.
- (3) Caraway fruits.





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- (4) Anis fruits.
  - (5) Fennel fruits.
  - (6) Parsley fruits.
  - (7) Cardamom fruits.
  - (8) Coriander fruits.
  - (9) Visnaga fruits.
  - (10) Hemlock fruits
  - (11) Senna fruits.
  - (12) Juniper berries.
  - (13) Rose Hips.
  - (14) Nux Vomica seeds.
  - (15) Coffee seeds
  - (16) Strophanthus seeds.
  - (17) Black seeds.
  - (18) Fenugreek seeds.
  - (19) Autumn crocus seeds
  - (20) Cacao seeds.

**-C-Bark, subterranean organs, flowers, woods, unorganized drugs  
(Gums, resins dried juice, Dried latex)**

- (1) Potentilla rhizoma.
- (2) Calamus rhizoma
- (3) Galanga rhizoma .
- (4) Javanese turmeric rhizoma.
- (5) Ginger rhizoma.
- (6) Cinchona bark.
- (7) Cascara bark.
- (8) Frangula bark.
- (9) Cinnamon bark.
- (10) Saffron flowers.
- (11) Mullein flowers.
- (12) Mallow flowers.
- (13) Red-sorrel flowers.
- (14) Arnika flowers
- (15) Lavander flowers.
- (16) Elder flowers
- (17) Lime tree flower
- (18) Clove flowers.
- (19) Chamomile flowers.
- (20) Marigold flowers.



- (21) Passiflora flowers.
- (22) Gentian roots.
- (23) Restharrow roots.
- (24) Ipecacuahna roots.
- (25) Ginseng roots.
- (26) Marshmallow roots.
- (27) Rhatany roots.
- (28) Primula roots.
- (29) Bitter wood.
- (30) Guaiacum wood and resin.
- (31) Aloe vera dried juice.
- (32) Opium dried latex.
- (33) Cannabis resin.
- (34) Traganth gum.
- (35) Balsam of tolu.
- (36) Squill bulbus.
- (37) Garlic bulbus.



### Course Contents

Course Number	:- 501442
Course Title	:- Biopharmaceutics
Pre-req.	:- 501342
Credit Hours	:- 2 hours .
Textbook(s) & Reference(s)	:- Biopharmaceutics and clinical Pharmacokinetics <b>By: M. Gibaldi .</b> Applied Biopharmaceutics and Pharmacokinetics <b>By : L. Shargel and A. Yu.</b>

### Description

<u>Topic</u>	<u>Hours</u>
Introduction	4
Plasma level – time curve	
Routes of administration	
Bioavailability and Bioequivalence	3
Gastrointestinal Absorption	
Physiologic factors	4
Test 1-	1
Dietary factors	5
Physico – chemical factors	2
Dosage form factors	4
Enteric coated medication	
Test 2-	1
Non- Oral Absorption	6

- Biopharmaceutics concerns the study of the relationship of the physico-chemical properties of the drug, the dosage form and the route of administration with the clinical response observed after the administration of the drug .



## Course Contents

Course Number	:- 501443
Course Title	:- Pharmacokinetics
Pre-req.	:- 501442
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Pharmacokinetics <b>By: M. Gibaldi .</b> Applied Biopharmaceutics and Pharmacokinetics <b>By : L. Shargel and A. Yu.</b>

## Description

<u>Topic</u>	<u>Hours</u>
Review of Mathematical concepts	4
Rate Fundamentals	2
Introduction to Pharmacokinetics	3
I.V. Administration	
Elimination Rate constant	3
Apparent volume of Distribution	3
Clearance	3
Estimation of AUC	2
Fraction of Drug Excreted in Urine	2
Pharmacokinetics of Oral Absorption	6
Intravenous Infusion	6
Multiple – Dosage Regimens	6
Nonlinear Pharmacokinetics	6



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Pharmacokinetics deals with the study of the time course of drug absorption, distribution, metabolism, and excretion and the relation of these with the onset, intensity and duration of action of drugs. Various mathematical relationships are devised to simulate the above rate processes .



## Course Contents

Course Number	:- 501341
Course Title	:- Pharmaceutics I
Pre-req.	:- 101221
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Pharmaceutics <b>By: M. Aulton .</b> Physical Pharmacy <b>By : A. Martin .</b>

## Description

<u>Topic</u>	<u>Hours</u>
Disperse System Classification- True solution Colloids- Coarse dispersions	2
Solutions Ionization Buffer solution	5
Solubility and Dissolution Rate Test 1- The phase rule Partition coefficient	5 1
Surface and Interfacial Phenomena Surface tension Adsorption	4
Colloids, Gels and Surfactants Test2- Coarse Disperse Systems Suspensions and Emulsions	4 1 4
Kinetics and Stability Testing	4

Pharmaceutics (I) studies the physico-chemical principles needed for the design, preparation and development of dosage forms and for the understanding of the bases of drug effect .



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## Course Contents

Course Number	:- 501311
Course Title	:- Medicinal Chemistry (1)
Pre-req.	:- 501211
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- <b>Wilson and Gisvold`s:</b> Textbook of organic medicinal and pharmaceutical chemistry 10 <sup>th</sup> Edition .

## Description

### 1. Introduction:

### 2. Physico-chemical properties in relation to biological activity :

- a) vocabulary and principles encountered
- b) factors influence :
  - ⇒ drug absorption
  - ⇒ drug distribution
  - ⇒ drug excretion
- c) Factors influence biological activity other than those included in (b):
  - ⇒ protein binding
  - ⇒ tissue depots
  - ⇒ drug metabolism
- d) Biological activity in relation:
  - ⇒ acid base properties of the drug
  - ⇒ PC in relation to structural changes
  - ⇒ ionization
  - ⇒ isosterism and bioisosteric concept
- e) physico-chemical parameters used in quantitative structure activity relationship.
- f) receptor and drug - receptor interactions.
- g) drug- receptor interaction: forces involved.
- h) steric, conformational and optical isomerism in relation to biological activity.
- i) drug receptor interaction and subsequent events (Drug-Receptor Theory) .



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### 3 - Drug metabolism and metabolizing enzymes:

- a) objectives
- b) Vocabulary
  - ⇒ xenobiotic
  - ⇒ endogenous substance
  - ⇒ bioactivation
  - ⇒ detoxication (detoxification)
  - ⇒ kidney excretion
  - ⇒ enterohepatic circulation and first - pass effects
  - ⇒ microsomes, enzyme induction
- c) purpose of drug metabolism
- d) sites of drug metabolism
- e) Paths of Metabolism : (two phase system)

1- phase I (biotransformation) reactions: Enzymatic reactions that transform endogenous or exogenous substances into more polar derivatives, this include oxidation's, hydroxylation's, reductions and hydrolysis reactions.

2- Phase II (conjugation) reactions:

In addition to conjugation reactions, methylation and acetylation reactions are included.

- f) Factors influencing drug metabolism:
  - ⇒ species differences.
  - ⇒ genetic differences.
  - ⇒ physiological factors: age , hormonal states , sex , pathological conditions, pharmacodynamics and environmental factors.
- g) stereochemical aspects in drug metabolism.

### 4 - Autonomic drugs

#### I - Cholinergic drugs and related agents:

- a- introduction
- b- cholinergic receptors
- c- cholinergic agents:
  - 1) stereochemical aspect
  - 2) structural modifications in relation to cholinergic agonists
- d- indirect acting cholinergic agonists (cholinesterase - inhibitors)
  - 3) the nature of and the mechanism of hydrolysis of Ach by AchE .
  - 4) reversible inhibitors their chemistry and SAR.



5) irreversible inhibitors - their chemistry and SAR

6) Alzheimer`s Disease.

a- history, charcters, cholinergic pathology, other factors and causes .

b- treatment, mechanisms of action and structural features

i– Cholonergic agents (AChE inhibitors) . Physostigmine  
Tacrine, Donepezil, Rivastigmine , Reminyl, others;

## II- Cholinergic blocking agents:

a - postganglionic - blocking agents

\* general structural modifications

\* stereochemical aspect.

b - ganglionic blocking agents

c - neuromuscular blocking agents, structural requirements,

## III - Adrenergic drugs and related agents:

a - adrenergic neurotransmitters.

b - structure and physicochemical properties of the adrenergic transmitters.

c - biosynthesis and its application in the design of antihypertensive agents.

d - general SAR for sympathomimetic agent, ( direct, and indirect )

e - adrenergic drugs and their selectivity toward,  $\alpha$ -1,  $\alpha$ -2,  $\beta$ -1,  $\beta$ -2 and their structural differences ( as agonists ) .

f - adrenergic blocking agents .

\* neuronal blocking agents and their structural feature .

\*  $\alpha$ - blockers, nonselective, selective, differences in their structural and functional groups.

\*  $\beta$ - blockers, selective, nonselective their structural requirements, side effects associated with the differences in their structure .

## 5- Galaucoma:

a- classification

b- symptoms

c- treatments

i- laser surgery

ii- operative surgery

iii- drugs

1- Carbonic anhydrase inhibitors: such as Dorzolamide, Brinzolomide, others.

2- Cholinergic agents (direct, indirect) such as Carbachol, Pilocarpine, Demecarium, others .



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- 3- Beta – adrenergic blockers such as Timolol , Betaxolol others .
  - 4-  $\alpha$ -2 agonist, Apraclonidine, others .

**6- Asthma and Treatment :**

- a - definition
- b- Types of asthma , their triggers , mediator responses .
- c- cAMP/c GMP ratio in asthma
- d- Classes of drugs used in treatment of asthma .
  - i- anticholinergic ( ipratropium, others )
  - ii-  $\beta$ -2 adrenergic agonist ( salbutamol, salmeterol, others ) .
  - iii- Methylxanthines ( Enprofylline , others )
  - iv- Antiinflammatory
    - a- steroids
    - b- Cromones
    - c- Lipooxygenase inhibitors
    - d- Leukotriene antagonists
    - e- thrombxane A<sub>2</sub> synthase inhibitor
- v- Recent class “potassium channel opener” .



## Course Contents

Course Number	:- 501312
Course Title	:- Medicinal Chemistry (2)
Pre-req.	:- 501311
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- <b>Wilson and Gisvold`s:</b> Textbook of organic medicinal and Pharmaceutical chemistry 10 <sup>th</sup> Edition . Principles of Medicinal chemistry , 4 <sup>th</sup> <b>Edition .Foye , W.O.; Lemke , T.L;</b> <b>williams , D.A.</b>

## Description

- x- **Histamine and antihistaminic agents:**
  - a) histamine (location and pharmacological action)
  - b) release of histamine
  - c) metabolism
  - d) histamine (tautomers and conformers)
  - e) receptor (H1 & H2) conformational requirements
  - f) histamine agonists and antagonists –H-1- . Structural variation and selectivity.
  - g) H-2 antagonists, structural specificity
  - h) mechanisms of inhibition of pepsin activity
- x- chemical complexation
- x- PH control
- x- antacid
- x- antisecretory.
- i) Proton pump inhibitors , structural aspect, variation in structures with that of H-2 antagonists.
- j) H–3 receptor, pharmacological role, agonist, antagonists.

- x- **Diuretics:**
  - a) Definition
  - b) the nephron and sites of reabsorption
  - c) enzymatic factors involve in reabsorption
  - d) classification, chemical structure, properties of :
    - x- osmotic agents
    - x- acid forming diuretics
    - x- carbonic anhydrase inhibitors

- x- thiazides and related compounds
- v- sulfamoylbenzoic acid derivatives, furosemide (lasix) and related compounds.
- vi- potassium – sparing diuretics
- vii- aldosterone antagonists
- viii- phenoxyacetic acid derivatives
- ix- mercurial diuretics
- x- xanthines

### **9) Cardiovascular agents:**

- a- Terminology, biochemical events.
- b- Classification
  - i- antianginal agents and vasodilators
  - ii- antiarrhythmic agents .
  - iii- antihypertensive agents
  - iv- antihyperlipidemic agents
  - v- sclerosing agents
  - vi- cardiotoxic drugs
- c- Chemistry of each division, structure activity relationships, mechanism through which each division produces its therapeutic effects.
- d- chemical and biochemical aspects of interest associated with each division.

### **10) Anticoagulants:**

- a- platelets aggregation mechanism
- b- clot formation mechanism
- c- drugs used as anticoagulant
  - i- heparin, low molecular weight heparins, others .
  - ii- coumarins, structural modifications and group variation in association with the mechanism of action
- d- Antiplatelets, such as aspirin, dipyridamol, anturan and ticlopidine, others. Their mechanisms of action, structural variation .
- e- Fibrinolytics and antifibrinolytics

### **11) Thyroid and antithyroid agents:**

- a- thyroid hormones
  - i- function
  - ii- synthesis
  - iii- thyroxine SAR and analogs .
- b- antithyroid drugs and their mechanisms of action
- c- structure activity relationships .



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### **12) Oral hypoglycemic agents**

- a- type of diabetes
- b- historical concept associated with the development of oral hypoglycemic agents
- c- sulfonyl urea, SAR, chemistry, metabolism
  - i- first generation
  - ii- second generation
  - iii- third generation
- d- biguanides, chemistry, SAR, mechanism of action.
- e-  $\alpha$ -glucosidase inhibitors.
- f- thiazolidinedione and others.
- g- Ethoxybenzoic acid.
- h- Oral insulin "where we re now".

### **13) Non-steroidal antiinflammatory agents:**

- a- introduction
- b- inflammation mechanism
- c- antiinflammatory mechanism
- d- classification, SAR, chemistry
  - i- salicylates
  - ii- fenamates
  - iii- aryl and heteroarylacetic acid
  - iv- other derivatives
- e- general remark concerning structural requirements for NSAIA, non selective COX.
- f- COXII inhibitors, structure, selectivity, advantages.
- g- Disease modifying antirheumatic drugs.

### **14) Antigout agents**

- a- disease state.
- b- treatment.
  - i- increase urinary excretion of uric acid.
  - ii- inhibition of uric acid formation (Xanthine oxidase inhibitor).
  - iii- with colchicines.

### **15) CNS Agents:**

- a- terminology, points to be consider in dealing with drug affecting CNS.
- b- classification.
  - i- antipsychotics.
  - ii- antidepressants.
  - iii- antiepileptics.
  - iv- antiparkinsonian drugs.



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v- narcotic analgesics.

### **I - Antipsychotics :**

- \* neurotransmitters in CNS
- \* Antipsychotic agents
- \* mechanism of action
- \* classification , SAR, chemistry specific advantages for each class.
- \* other classes, ( miscellaneous)

### **II- Anxiolytic agents**

- i- introduction
- ii- receptor involve
- iii- mechanism of action
- iv- therapy
- v- products of benzodiazepine, chemistry , metabolism , SAR and application.

### **III - Antidepressants :**

- a- introduction
- b - types of antidepressant
  - i- tricyclic ( amitriptyline , imipramine, etc)
  - ii- MAO inhibitors (phenelzine, tranylcypamine )
  - iii- miscellaneous (amoxpine , trazodone, etc.)
  - iv- chemistry ,SAR and selectivity of each of the above class to reuptake process.

### **IV - Antiepileptics :**

- a- etiology
- b- mechanism of action of various antiepileptics.
  - i- inactivation of the Na<sup>+</sup> channels ( phenytoin, carbamazepin, lamotrigine, valproate .
  - ii- reduction of Ca<sup>++</sup> flow through T- type Ca<sup>++</sup> Channel . ( valproate, dimethadione, ethosuximide ) .
  - iii- enhance GABA synthesis, release and retard GABA metabolism (metharbital, vigabatrin, gabapetin , topamax) .

The chemical structure for the above compounds in regard to the site of action .



### V - Antiparkinson`s drugs :

- i- neurons that degererate in parkinson`s disease and the neuro-transmitters involved .
- ii- dopamine precursor and dopamine receptor agonists, their structural feature (dopa, carbidopa, parlodel, pergolide, cabergoline, pramipexol, requip ).structural similarity, differences are indicated .
- iii- COMT inhibitor : tolcapne and other.
- iv- MAO inhibitor : eldepryl and others .
- v- antimuscarinic agents ( kemadrine, tremin, parsidol and budipin .

chemical aspect of the above compounds and their selectivity to their mechanism of action .

**VI- Narcotic analgesics:** morphine and related drugs , synthetic analogues, enkephalines and related peptides

### 20- **Obesity and Treatment**

- a- introduction .
- b- neurotransmitters that affect food intake and thermogenesis .
  - i- those increase food intake (neuropeptide and others).
  - ii- those decreased food intake and appetite (serotonin, dopamine, leptin and others) .
- c- antiobesity drugs .
  - i- those increase sympathetic activity .
  - ii- appetite suppressant (Fenfluramine, Sibutramine and others).
  - iii- drugs reduce fat absorption (Lipase inhibitor such as orlistat) .
  - iv-  $\beta$ -3-receptor agonist (facilitate lipolysis in adipose tissue such as BTA-243).
  - v- Triboxil, combination of compounds .

### 21- **Migraines and Treatment**

- a- Introduction .
- b- Classification or types .
- c- Current theories in migraine headache .
- d- drugs used in migraine .
  - i- Ergot derivatives (ergotamine tartarate in various formulation).
  - ii- Selective agonists for 5-hydroxytryptamine such as (sumatripan,
    - “Imitrex”, Zolmitriptan, “Zomig”, Rizatriptan “Maxalt” .
  - iii- Analgesic and antiinflammatory agents .



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## **Course Contents**

Course Number	:- 501562
Course Title	:- Drug Information .
Pre-req.	:- Fifth Year.
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:-

## **Description**

The aim of the course is to educate pharmacy students on how to obtain accurate, relevant and current data about drugs use in a given patient or illness .

- 1- Drug Information Resources :-
  - Primary sources .
  - Secondary sources .
  - Tertiary sources .
- 2- Web Sites and Information Technology .
- 3- DI Databases .
- 4- On-Line Pharmacy, Pharmacology and Toxicology Journals .
- 5- Strategies for Evaluating Information Requests .
  - Determine the reason for the inquiry .
  - Clarify the drug's identification and availability .
- 6- Search Strategies .
  - Define the question .
  - Determine the type of information needed .
  - Collect as much information as possible .
  - Explore other possible information resources .
- 7- Evaluating Clinical Study
  - The objective of the study .
  - The subjects of the study .
  - The administration of the drug treatment .
  - The setting of the study .
  - The methods and design of the study .
  - The analysis of the study .





- 8- General Guidelines for Responses to Drug Information requests .
- 9- Practical Examples .
- 10- Pharmacies Online World Wide .
- 11- Hospitals Online World Wide .



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## Course Contents

Course Number	:- 501451
Course Title	:- Pharmacology II
Pre-req.	:- 501351
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- The Pharmacological basis of Therapeutics <b>By:- Goodman and Gilman's</b> McGraw-Hill Co. Basic and Clinical Pharmacology <b>By:- Katzung</b> Lange Medical Publications . Medical Pharmacology <b>By:- Andres Goth .</b> Mosby Co.

## Description

This course is designed to provide the Pharmacy student with a useful orientation to Pharmacology in order to give her the basic information concerning general principles, theories and facts about drugs in terms of specific effects on bodily systems, clinical uses, contraindications and adverse effects.

## Course Objective :-

- 1.To study the pharmacological agents that alter the biochemical and physiological processes which may have some implications in the origin, prevention or cure of diseases.
- 2.To emphasize general pharmacologic principles that will enable the student to evaluate and use drugs safely and effectively.
- 3.To correlate pharmacology with the related medical sciences.

## Chemotherapy :-

- Introduction.
- Classification ,mechanism of action.
- Beta-lactam antibiotics.
- Penicillins,Cephalosporins, others.
- Aminoglycosides.
- Tetracyclines, Chloramphenicol.
- Macrolides antibiotics.



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- Sulfonamides
  - Drugs used in treatment of T.B.
  - Urinary tract antiseptics
  - Antifungal drugs
  - Antiviral drugs
  - Antiprotozoal drugs, Antihelminthics
  - Anti-neoplastic drugs

**Endocrine Pharmacology :**

- Anterior Pituitary Hormones.
- Thyroid hormones and Anti-thyroid drugs.
- Adrenocorticosteroids.
- Pancreatic hormones and Antidiabetic drugs.
- Reproductive hormones and oral Contraceptives.

**Drugs Acting On Blood :**

Drugs used in disorders of coagulation.

Drugs used in hyperlipidemia.

**Non-Steroidal Antiinflammatory Drugs :**

Classification of NSAIDs.

Newer NSAIDs.

Disease-modifying anti-rheumatic drugs.

Drugs used in treatment of gout .

**Prostaglandin's And Related Drugs :**

**Autoacoids (Local Hormones ):**

Histamine.

Histamine Antagonists (Antihistaminic drugs).

**Evaluation :**

First Examination            25%

Second Examination        25%

Final Examination            50%



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## Course Contents

Course Number	:- 501531
Course Title	:- Toxicology For Pharmacy Students
Pre-req.	:- 501351
Credit Hours	:- 3 hours .
<b>Textbook(s) &amp; Reference(s)</b>	<b>:- Casarett and Doull's Toxicology.</b> The basic Science of Poisons. Edited by : Curtis D.Klaassen and John <b>B. Watkins III</b> <b>Publisher : McGraw-Hill , New York</b> Environmental Toxicology. Impact of Environmental Toxicants on living Systems. <b>By : Ming-Ho Yu</b> <b>Publisher : CRC press , 2000</b> Poisoning and Toxicology Compendium. <b>By : Jerrold B. Leiken and frank P. Paloucek</b> <b>Publisher : Lexi-Comp Inc. , Ohio , 1998.</b>

## Description

This course will introduce students to the clinical toxicology of commonly encountered poisons. Emphasis is placed on underlying toxicological mechanisms as well as on clinical evaluation and management of poisoned patients.

## Course Objectives :

1. To study the dose-response relationship & the risk associated with the use of chemicals.
2. To discuss the major types of toxic reactions with examples.
3. To study the prevention and treatment of poisoning.
4. To identify the strategies for poison prevention education.
5. To discuss the efficacy, mechanism of action, dose, side effects, contraindications and possible complications associated with the treatment of poisoning by many means.



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**Course Contents :-**

**Principles of Toxicology :**

**General Principles of Management of Poisoned patients :**

**Toxicity Testing Procedures :**

- Acute Toxicity studies.
- Short term toxicity studies.
- Long term toxicity studies.
- Special toxicity studies :
- (Carcinogenesis , Teratogenesis.....)

**Toxicology of Non-therapeutic agents :**

- Industrial poisons.
- Agricultural poisons.
- Air pollutants.

Food additives.

Heavy metals.

**Target Organ Toxicity :**

- Toxic Responses of the Liver.
- Toxic Responses of the Kidney.
- Toxic Responses of the Respiratory system.
- Toxic Responses of the Nervous system.
- Toxic Responses of the Endocrine system.

**Clinical Toxicology :**

- Drugs as toxic agents.
- Drug of abuse.



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## Course Contents

Course Number	:- 501351
Course Title	:- Pharmacology I
Pre-req.	:- 502212
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- The pharmacological basis of Therapeutics <b>By:- Goodman and Gilman's (10<sup>th</sup> edition), 2000.</b> McGraw-Hill Co. Basic and Clinical Pharmacology <b>By:- Katzung .</b> Lange Medical Publications . Medical Pharmacology <b>By:- Andres Goth .</b> Mosby Publishing Co.

## Description

This course is designed to provide the pharmacy student with a useful orientation to pharmacology in order to give the basic information concerning general principles, theories & facts about drugs in terms of specific effects on bodily systems, clinical uses, contraindications adverse effects .

## Course Objectives :-

- 1- To study the pharmacological agents that alter the biochemical and physiological processes which may have some implications in the origin, prevention or cure of diseases .
- 2- To emphasize general pharmacological principles that will enable the students to evaluate and use drugs safely and effectively.
- 3- To correlate pharmacology with the related medical sciences

## Course Contents :-

### **Basic Principles of Pharmacology :-**

- Introduction .
- Drug receptors & Pharmacodynamics .
- Pharmacokinetics .
- Drug Biotransformation
- Basic & Clinical Evaluation of new drug .



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**Autonomic Pharmacology :-**

- Introduction .
- Cholinoceptor activating and cholinesterase inhibiting drugs .
- Cholinoceptor blocking drugs .
- Adrenoceptor activating drugs .
- Adrenoceptor antagonist drugs .

**Cardiovascular-Renal drugs :-**

- Antihypertensive drugs .
- Antianginal drugs .
- Cardiac glycosides & drugs used in congestive heart failure (CHF).
- Antiarrhythmic drugs .
- Diuretics .

**Drugs acting on CNS :-**

- Sedatives-hypnotic drugs .
- Antiepileptic drugs .
- Drugs used in neurodegenerative diseases .
- Antipsychotic agents .
- Opioid analgesics.
- General and local anesthetics .



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## Course Contents

Course Number	: - 501211
Course Title	: - Pharmaceutical Organic Chemistry
Pre-req.	: - 101113
Credit Hours	: - 4 hours .
Textbook(s) & Reference(s)	: - “Organic Chemistry” latest Edition, <b>By: R.T.Morrison and R.N. Boyd.</b> “Modern Principles of Organic Chemistry, An Introduction”. Latest Edition <b>By: J.L.kice and E.N.Marvell .</b>

## Description

This course is oriented towards understanding organic reactions mechanisms .

The following is a summary of the subjects that will be covered in the Pharmaceutical Organic Chemistry Course .

- 1- Introduction .
- 2- Types of bonds in organic molecules .
- 3- Acids and bases in terms of the different concepts/definitions .
- 4- Electron delocalization and resonance .
- 5- Effects of structure on reactivity. This includes the inductive effect, resonance effects and steric effects .
- 6- Unstable intermediates of carbon .
- 7- Hyperconjugation and tautomerism .
- 8- Nucleophilic substitution reactions which include unimolecular ( $S_N1$ ) and bimolecular ( $S_N2$ ) nucleophilic substitution reactions .
- 9- Elimination reactions, both unimolecular (E1) and bimolecular (E2)
- 10- Free radical substitution reactions .
- 11- Electrophilic addition reactions of alkenes and alkynes .
- 12- Nucleophilic addition reactions of aldehydes and ketones .
- 13- Substitution reactions of carboxylic acids and their derivatives .
- 14- Electrophilic aromatic substitution reactions .





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## Course Contents

Course Number	:- 501568
Course Title	:- Pharmaceutical Marketing .
Pre-req.	:- Fifth Year .
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- No specific text book is required. However, text books in sales and marketing would be helpful. - The course material is stemmed from the instructor practical experience in the field of sales and marketing and from training course of multinational companies for their medical reps .

## Description

By the end of this course the student should have a better understanding about selling concepts and techniques, with special emphasis on pharmaceutical detailing & selling in pharmacies. This course . This course will introduce also the essentials of marketing principles and concepts.

\* **Introduction .**

\* **Selling concepts:-**

- What is selling? And why do we study it?
- Role of sales people in society .
- Mythology of selling .
- Art of listening during doctor call .
- Characteristics of sales career and its paths .
- Personal characteristics of salespeople .
- Tasks of salespeople .
- Customer attitudes and why do people buy ?

\* **Pharmaceutical Detailing :-**

- Selling and prescribing processes.
- Planning the doctor call .
- Identifying doctor needs and how to attain to it .
- Relating and reinforcing benefits to the doctor .
- Obtaining feed back, both positive and negative and how to handle it .
- Handling doctor's objections .
- Gaining commitment and following up .
- Post call analysis (Evaluation of the doctor call) .



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- \* **Retail selling in pharmacies :-**
    - The approach .
    - Introduction & general concepts .
    - Making the sale .
    - Factors affect pharmacy sales .
    - Responsibilities of the pharmacist .
    - Problems in retail selling in pharmacies .
    - Profit & ethics in pharmacy business .
    - The technique of substitution for OTC and consumable products .
  
  - \* **marketing principles and concepts :**
    - Selling versus marketing .
    - Marketing functions .
    - Marketing principles and some useful definitions .
- Grading :-**
- 15% Class participation, assignments and / or quizzes .
  - 35% First & Second Exams .
  - 50% Final Exam.



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## Course Contents

Course Number	:- 501342
Course Title	:- Pharmaceutics II .
Pre-req.	:- 501341
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Pharmaceutics, the Science of Dosage form design <b>Edited By:- M.E. Aulton (latest available Edition)</b> Introduction to Pharmaceutics I <b>By: Ashok.K. Gupta (1991)</b> Introduction to Pharmaceutics II . <b>Ashok.k. Gupta and S.S. Bajaj (1991)</b>

## Description

- 1- Introduction remarks, general aspects and definitions .
- 2- Factors affecting the proper dose of a drug .
- 3- Weight and measures .
- 4- Pharmaceutical calculations .
- 5- The prescription, Latin terms and abbreviations .
- 6- Pharmaceutical incompatibilities .
- 7- Additives in pharmaceutical dosage form .
- 8- Pharmaceutical Dosage forms .
  - Mixtures .
  - Syrups .
  - Elixirs .
  - Linctus .
  - Oral Drops .
  - Draughts .
  - Mouth Washes .
  - Gargles .
  - Throat Paints .
  - Sprays .
  - Enemas .
  - Douches .
  - Ear drops .
  - Inhalations .
  - Nasal Drops .
  - Liniments .
  - Lotions .



9- Sterile Pharmaceutical Dosage forms .

- Injetables .
- Ophthalmic preparations .

10- Emulsions .

11- Ointments and Creams .

12- Suppositories .

13- Powders .



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## Course Contents

Course Number	: - 501567
Course Title	: - Non Prescription Drugs.
Pre-req.	: - 501441
Credit Hours	: - 3 hours .
Textbook(s) & Reference(s)	: - Hand Book of non prescription Drugs, Edited By: American Pharmaceutical Association. latest available Editions .
	<b>Web Sites .</b>
	- WWW. fda.Com
	- ncbi. nlm. nih. gov.
	- Any other relevant sites .

## Description

- 1- Introduction remarks on the course .
- 2- Titles of the subjects in the course :-
  - 1- Fever.
  - 2- Acne.
  - 3- Burns.
  - 4- Sun Burns.
  - 5- Minor wound and skin infections.
  - 6- Otic disorders .
  - 7- Minor foot disorders.
  - 8- Atopic dermatitis control dermatitis and dry skin .
  - 9- Diaper dermatitis .
  - 10- Prevention of sun-Induced skin disorders .
  - 11- Head lice .
  - 12- Scabies .
  - 13- Hair Loss.
  - 14- Stop smoking .
  - 15- Dandruff .



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## Course Contents

Course Number	:- 501532
Course Title	:- Community Health .
Pre-req.	:- Fifth year .
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Community Health for Student Nurses Mary F. Bradley 1987 . Essential Public Health Medicine . R . J. Donaldson L.J Donaldson 1993 .

## Description

### **1- Introduction .**

### **2- Health & Disease .**

- Defenitions .

### **3- Host Factors In Disease Causing .**

- Immunological factor .
- Genetic agents .
- Social factors .
- Physiological factors .
- Age .
- Sex .
- Race .
- Mental factors .
- Pscological factors .

### **4- Agent factors :-**

- Biological factors .
- Physiological factors .
- Chemical Agents .
- Nutrient Agents .
- Physical Agents .
- Mechanical Agents .
- Socio-psychological agents .

### **5- Environmental factors**

- Natural environment .
- Biological environment .
- Social environment .
- Economical environment .



## **6- General Preventive factors Health Promotion Factors .**

### **7- Environment**

- Water .
- Air .

### **8- Nutrition**

- Source of food .
- Types of food .
- Mal function disease .
- Food contamination .
- Food poisoning .

### **9- Maternal and child Health .**

### **10- The Health of Elderly .**

### **11- Mental Health .**

### **12- communicable Diseases .**

- sexually Transmitted Disease .
- AIDS .
- Infections Disease .



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## Course Contents

Course Number	:- 501561
Course Title	:- Clinical Pharmacokinetics
Pre-req.	:- Fifth year .
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Basic Clinical Pharmacokinetics <b>By: M. Winter</b> Applied Biopharmaceutics & Pharmacokinetics <b>By: L.Shargel &amp; A. Yu .</b> Biopharmaceutics & Clinical Pharmacokinetics . <b>By: M. Gibaldi .</b>

## Description

- Introduction .
- Basic Principles
- Drug Distribution and Elimination Concepts .
- Drug Protein Binding .
- Interpretation of Plasma Drug Concentration .
- Therapeutic Drug Monitoring .

Clinical Pharmacokinetics is the application of pharmacokinetic principles in drug therapy. It involves the use of kinetics of drug absorption, distribution, excretion, and metabolism for optimizing dosing regimens based on patients disease state .





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## Course Contents

Course Number	:- 502212
Course Title	:- Biochemistry II
Pre-req.	:- 502211 .
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- - L. Stryer; Biochemistry, 3,4rd edition . <b>By: W.H. Freeman and company/ NewYork</b> - R. Murray et.al; Harpers Biochemistry 22 <sup>nd</sup> edition. <b>By: Prentice-Hall international Inc.</b> - Principle of Biochemistry, Horton, Moran, OCHS, RAWN et.al. . <b>By: Neil Patterson Publishers Prentice Hall .</b>

## Description

### 1- Protein Metabolism

- 1-1 Digestion .
- 1-2 Absorption .
- 1-3 Defect in digestion and absorption of proteins .
- 1-4 Biological value of proteins .
- 1-5 Overall metabolism of nitrogen .  
Nitrogen intake, Nitrogen output, nitrogen balance .
- 1-6 Fate of Absorbed Amino acids .  
Anabolic purposes, catabolic purposes .

### 2- Deamination of Amino Acids

- 2-1 General methods (Oxidative deamination, Transamination, Transdeamination)
- 2-2 Specific methods :  
Glycine oxidase, Glycine cleavage system, Histidase, Dehydratases, Desulphydrases, Hydrolytic Deaminase, Reductive Deaminases .
- 2-3 Fate the ammonia removed  
Anabolic pathways, Catabolic and Excretory Pathways .
- 2-4 Role of liver in protein metabolism .

### 3- Urea Formation



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**4- Fate : of Carbon Skeleton :-**

- 4-1 Resynthesis of Amino Acid .
- 4-2 Glucogenic pathway .
- 4-3 Ketogenic pathway .
- 4-4 Miscellaneous pathway .

**5- Effect of Hormones on protein metabolism**

- 5-1 Growth hormone .
- 5-2 Thyroxine .
- 5-3 Glucocorticoids .
  - a- Protein Anabolic Effect.
  - b- Protein Catabolic Effect.
- 5-4 Insulin ,
- 5-5 Androgen .
- 5-6 Estrogens .

**6- Metabolism of Individual Amino Acids :-**

Alanine, Threonine, Serine, Glycine, Methionine, Cysteine and Cystine, Valine, Leucine and Isoleucine, Aspartic acid, Glutamic acid, Arginine and Ornithine, Metabolism of  $\beta$ -alanine, Proline and hydroxyproline, Lysine and hydroxylysine, Histidine, Tryptophan, Phenylalanine and Tyrosine .

**7- Interconversion of Carbohydrates, fats and proteins :-**

- a- Conversion of Carbohydrates to fats (lipogenesis) .
- b- Conversion of Carbohydrates to proteins .
- c- Conversion of proteins to carbohydrates (gluconeogenesis) .
- d- Conversion of proteins to fats .
- e- Conversion of fats to carbohydrates (gluconeogenesis) .
- f- Conversion of fats to proteins .

**8- Metabolism of Creatine :-**

Chemistry, Biosynthesis, Function, Fate and excretion, Creatinuria.

**9- Ketone bodies (Ketogenesis)**

- 9-1 Chemistry, Biosynthesis, regulation, importance .
- 9-2 Ketolysis
  - a- Complete oxidation of ketone bodies to CO<sub>2</sub> and water .
  - b- Regulation .
  - c- Importance .



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## **10- Metabolism of Heme**

- 10-1 Biosynthesis .
- 10-2 Catabolism .
- 10-3 Serum Bilirubin .

## **11- The Hexose monophosphate (HMP) shunt pathway .**

- 11-1 Regulation .
- 11-2 Importance .
- 11-3 The uronic Acid pathway .
- 11-4 Importance .

## **12- Gluconeogenesis .**

Steps, sources, regulation, importance .

## **13- Plasma lipids :-**

Introduction, classification, separation .

## **14- Metabolism of Plasma Lipoproteins :-**

- 14-1 Metabolism of Chylomicrons .
- 14-2 Metabolism of VLDL .
- 14-3 Metabolism of LDL .
- 14-4 Metabolism of HDL .
- 14-5 Metabolism of free fatty acids .
- 14-6 Hypolipoproteinemias .
- 14-7 Hyperlipoproteinemias .

## **15- Hormones**

- 15-1 Introduction .
- 15-2 Recent classification of hormones action .
- 15-3 General characteristics of hormones .
- 15-4 Endocrine glands .
- 15-5 Classification of Hormones .
- 15-6 Polypeptide or protein hormone s.
- 15-7 Steroid hormones .
- 15-8 Mechanism of Action of hormones .
- 15-9 Important function of individual hormones .



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## 16- Vitamins

### 16-1 Classification of vitamins :-

#### a- Fat soluble vitamins (A, D, K, E) .

- Chemistry, Properties, Sources, Functions, Absorption,
- Transport and Excretion .
- Requirements, Deficiency manifestation .

#### b- Water – soluble vitamins .

- Vitamin C, Vitamin B complex .  
Thiamine B<sub>1</sub>, Riboflavin B<sub>2</sub>, Niacin, Pantothenic acid,  
Pyridoxine B<sub>6</sub>, Biotin, lipoic acid, Inositol, Para-  
Aminobenzoic acid PABA, Folic acid, Cobalamin .
- Chemistry, Properties, Sources, Requirements, Absorption,
- Transport and excretion.
- Function, Deficiency manifestations .

## 17- Immunology (Immunoglobuline)

Introduction, General properties, classification, importance, IgG, IgA, IgM, IgD, IgE .



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## Course Contents

Course Number	: - 502211
Course Title	: - Biochemistry I
Pre-req.	: - 101113 .
Credit Hours	: - 3 hours .
Textbook(s) & Reference(s)	: - L. Stryer; Biochemistry, 3,4rd edition . <b>By: W.H. Freeman and company/ New York</b> - R. Murray et.al; Harpers Biochemistry 22 <sup>nd</sup> edition. <b>By: Prentice-Hall international Inc.</b> - Principle of Biochemistry, Horton, Moran, OCHS, RAWN et.al. . By Neil Patterson Publishers Prentice Hall .

## Description

### 1- Proteins Chemistry

#### 1-1 Amino acids

##### 1.11- Chemical classification of amino acids

- a- Aliphatic, aromatic and heterocyclic amino acids .
  - b- Nutritional classification of amino acids .
  - c- Amino acids are linked by peptide bonds .
  - d- The peptide unit is rigid and planar.
  - e- Protein modification and cleavage confer new capabilities .
- 1.21. Nutritional classification of amino acids .
- 1.31. Metabolic classification of amino acids .

#### 1-2 Chemical Properties of Amino Acids

##### 1.21. Properties due to amino group :-

- a- Salt formation .
- b- Methylation .
- c- Reaction with formaldehyde .
- d- Reaction with Nitrous Acid .
- e- Reaction with hydrogen Peroxide.
- f- Reaction with carbon Dioxide .

##### 1.22. Properties due to Carboxyl group :

- a- Salt formation .
- b- Esterification .
- c- Decarboxylation .



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**1.23. Properties due to both amino and carboxyl groups :**

- a- Amphoteric properties .
- b- Formation of peptide linkage .
- c- Formation of Diketopeperazine .
- d- Ninhydrin Reaction .

**1.24 Properties due to the “R” radical :**

- a- Xanthoproteic reaction .
- b- Millon’s reaction .
- c- Rosenheim’s reaction .
- d- Sulfur reaction .

**1.25 Separation and identification of amino acids :**

- a- Paper chromatography .
- b- Thin layer chromatography (TLC) .
- c- Column chromatography .
- d- High voltage electrophoresis .

**1.26 Structure of proteins**

- a- Primary structure of proteins .
- b- Secondary structure of proteins .
- c- Tertiary structure of proteins .
- d- Quaternary structure of proteins .

**1.27 Properties of proteins .**

- 1.28 Solubility .
- 1.29 Amphoteric properties .
- 1.30 Colloidal properties .

**1.31 Precipitation :-**

- a- Addition of alcohol .
- b- Concentrated salt solution .
- c- At the isoelectric point .
- d- Salts of heavy metals .
- e- Alkaloidal reagents .

**1.32 Denaturation :**

- a- Chemical changes .
- b- Physical changes.
- c- Biological changes.
- 1.33 Flocculation and coagulation .

**1.34 Color reactions :**

- a- Biuret reaction .
- b- Other color reaction



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### **1.35 Fractionation and Purification of proteins**

A mixture of proteins may be separated by :

- a- Precipitation .
- b- Ultracentrifugation .
- c- Column chromatography .
- d- Electrophoresis .

### **1.36 Classification of proteins :**

- a- Simple proteins .
- b- Conjugated proteins .
- c- Derived proteins .

## **2- Enzymes :- classification, function .**

- 2.1 Chemical nature of enzymes .
- 2.2 Enzyme terminology .
- 2.3 Mechanism of enzyme action .
- 2.4 Coenzymes .
- 2.5 Metal ion activators .

### **2.6 Specificity of enzyme :**

- 2.61 Low specificity .
- 2.62 Group specificity.
- 2.63 Absolute specificity
- 2.64 Stereochemical and optical specificity .

### **2.7 Factors affecting the rate of enzymic reaction :**

- 2.71 Nature of enzyme .
- 2.72 Concentration of substrate .
- 2.73 Concentration of enzyme .
- 2.74 PH .
- 2.75 Temperature 2.75 ionic strength .

### **2.8 Introduction to enzymes :-**

- 2.81 Enzymes transform different forms of energy .
- 2.82 Free energy is the most useful thermodynamic function in biochemistry
- 2.83 Standard free-energy change of a reaction and its relation to the equilibrium constant .
- 2.84 Enzymes cannot alter reaction equilibria .
- 2.85 Enzymes accelerate reactions by stabilizing transition states .
- 2.86 Formation of an enzyme-substrate complex is the first step in enzymatic catalysis .
- 2.87 Some key features of active sites .



- 2.88 The Michaelis-Menton Model accounts for the kinetic properties of many enzymes .
- 2.89  $V_{\max}$  and  $K_m$  can be determined by various substrate concentration .
- 2.90 Significance of  $k_m$  and  $V_{\max}$  values .
- 2.91 Enzymes can be inhibited by specific molecules .
- 2.92 Allosteric enzymes do not obey Michaelis Menten Kinetics .
- 2.93 Competitive and noncompetitive inhibition are kinetically distinguishable .
- 2.94 Ethanol is used therapeutically as a competitive inhibitor to treat ethylene glycol poisoning .
- 2.95 Penicillin irreversibly inactivates a key enzyme in Bacterial cell-wall synthesis .

### **2.9 Mechanisms of Enzyme Action :**

#### **2.10 Classification of enzymes :**

- a- Oxidoreductases .
- b- Transferases .
- c- Hydrolases .
- d- Lyases .
- e- Isomerases.
- f- Ligases .

#### **2.11 Control of enzymatic Activity .**

#### **2.12 Generation and storage of metabolic energy bioenergetics .**

### **3- Carbohydrates :**

- 3.1 Carbohydrate chemistry .
- 3.2 Classification (monosaccharides, Di and polysaccharides).
- 3.3 Chemical properties of mono, Di and polysaccharide).
- 3.4 Trioses and tetroses .
- 3.5 Pentoses, hexoses .

### **4- Lipid Chemistry**

- 4.1 Classification .
- 4.2 Fatty acids, chemical properties of FA .
- 4.3 Neutral fats chemicals properties of Neutral Fats .
- 4.4 Physical properties of Neutral and Fatty Acids .
- 4.5 Phospholipids.
- 4.6 Glycolipids .
- 4.7 Derived lipids (Sterols, Steroids, Cholesterol, Bile Acids, Steroid hormone).





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## **5- Metabolism :**

### **5.1 Introduction to metabolism .**

### **5.2 Carbohydrate metabolism .**

5.21 Digestion.

5.22 Absorption .

5.23 Defects in digestion and absorption .

5.24 Fate of absorbed sugars .

5.25 Major pathway of glucose oxidation .

a- anaerobic phase, regulation, importance .

b- energy yield in absence of oxygen .

c- energy yield in the presence of oxygen .

### **5.26 Aerobic phase :**

Oxidation of pyruvate into Acetyl-CoA regulation.

5.27 The citric acid cycle, regulation, importance of Krebs cycle.

5.28 Energy yield of krebs cycle .

5.29 Energy yield of the Aerobic phase .

5.30 Metabolism of galactose.

5.31 Metabolism of Fructose.

5.32 Gluconeogenesis .

5.33 Glycogenesis .

5.34 Glycogenolysis, regulation, liver and muscle glycogen .

5.35 Glycogen metabolism .

## **6- Lipid metabolism**

6.1 Digestion .

6.2 Absorption .

6.3 Defects in digestion and absorption of lipids.

6.4 Fate of absorbed lipids.

6.5 Lipolysis in adipose tissue .

6.6 Oxidation of fats.

6.7 Beta oxidation of fatty acids, importance, energy yields, regulation.

6.8 Omega oxidation of fatty acids.

6.9 Alpha oxidation of fatty acids.

6.10 Origin of active acetate.

6.11 Fate of active Acetate.

6.12 Formation of steroids.

6.13 Lipogenesis, Biosynthesis of glycerol, Biosynthesis of fatty acids,  
source of NADPH, regulation of fatty acid synthesis .

6.14 Biosynthesis of triacylglycerols .



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## **7- Phospholipid and Glycolipid metabolism**

Introduction, functions, biosynthesis, degradation :

7.1 metabolism of the unsaturated fatty acids, function, oxidation .

## **8- Cholesterol Metabolism**

a- Introduction (Digestion, Absorption), Biosynthesis, regulation of biosynthesis, Functions, Catabolism and Excretion, Bile acids.

## **9- Nucleic Acid :-**

Pyrimidines, Purines, Pentosis, Nucleotides.

9.1 Nomenclature of Nucleosides and Nucleotides .

9.2 Polynucleotide .

Structure of Nucleic acid .

9.3 Structure of DNA .

9.4 Structure of RNA .

9.5 Biological importance of Nucleic acids .

## **10- Purine metabolism :**

10.1 Biosynthesis, purine salvage .

10.2 Regulation of purine biosynthesis .

10.3 Catabolism .

### **Pyrimidine metabolism .**

10.4 Biosynthesis, pyrimidine salvage.

10.5 Regulation of pyrimidine biosynthesis .

10.6 Catabolism .

10.7 Disorder of pyrimidine metabolism .

## **11- Metabolism of Nucleic acid :**

Digestion, Absorption, Biosynthesis of RNA, Biosynthesis of DNA, Catabolism of Nucleic acid, Function of Nucleic acid .

## **12- Protein synthesis :**

a- Carriage of amino acids by tRNA .

b- Transcription .

c- Translation (Initiation, Elongation, Termination, Regulation of protein synthesis) .

## **13- Recombinant DNA technology .**



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## Course Contents

Course Number	:- 501564
Course Title	:- Drug Design
Pre-req.	:- Fifth Year. .
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- -Text book of drug design and development. Ed. PovL krogsgaard and Hans Bundgaard . - The organic chemistry of drug design and drug action Richard B. Silverman . - Modern drug research series.

## Description

- 1- Various incidence to the discovery of a lead compounds (a) accidental (b) experience .
- 2- manipulation of a lead compound to a drug from different aspect such as structural, clinical observation, side effects, metabolism, biochemical differences between various species, etc ...
- 3- Drug design based on quantitative structural factors and molecular modeling .
- 4- Prodrug approach .
- 5- drug design based on receptor and enzyme structural and conformational understanding .
- 6- theoretical aspect of drug design .
- 7- Receptors (a-intracellular receptor b-ligand regulated transmembrane enzyme. C-ligand gated-channels. d-G- protein and second messengers .
- 7- Objective in drugs design (i.e. )
  - I -introduction of vulnerable moiety .
  - ii- elimination of vulnerable moiety .
  - iii- introduction of disposable moiety .
  - iv- symmetrical and asymmetrical bifunctional moiety .
  - v- drug substituted drugs and others .
- 8- Soft and hard drugs .
- 10- Various methods in “ cytotoxic agents delivery to cancer cells” .
- 11- Structural manipulation in drug discovery in the area of angiotensine converting enzyme inhibitors and AT1-receptor, vassopressine antagonists, cytotoxin and others .
- 12- Problems in drug design and a suggested approach to solve that problem .
- 13- Introduction to computer graphic simulation .



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**Course Contents**

Course Number	:- 501422
Course Title	:- Pharmacy management and accounting
Pre-req.	:- Fourth Year. .
Credit Hours	:- 2 hours .
Textbook(s) & Reference(s)	:- Essential of Pharmacy Management .

**Description**

The course is designed to teach the student of pharmacy the basic principle and knowledge on management and accounting and the necessary accounting documents that should be used in pharmacy. The students will be taught such topics as introduction to the business administration and the role of management in the pharmacy business, definition of accounting, type of accounting, relationship between accounting and other fields of knowledge, steps of accounting cycle, double entry system, balance sheet equation, recording of capital transactions and depreciation of fixed assets, revenue transactions (i.e. purchases and sales transactions; purchase returns & allowance; sales returns and allowances; and discounts), Accounting books ( i.e. journal book, ledger book and subsidiary books), posting from journal book to ledger book and balancing of accounts, preparing of trail balance, corrections of accounting errors, preparing the financial statements (adjusting accounts; closing accounts ; income statements preparation and balance sheet forming).



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## Course Contents

Course Number	:- 501570
Course Title	:- Herbal Medicine
Pre-req.	:- Fifth Year. .
Credit Hours	:- 3 hours .
Textbook(s) & Reference(s)	:- Herbal medicine Second edition . <b>(Barnes, Anderson and Phillipson).</b>

## Description

- 1- Olive leaves.
- 2- Hawthorn flowers and leaves.
- 3- Artichoke leaves.
- 4- Willow bark.
- 5- St. John's wort.
- 6- Valerian.
- 7- Siberian Ginseng = Eleutherococcus senticosus.
- 8- Saw Palmetto.
- 9- Kava kava.
- 10- Cimicifuga racimosa.
- 11- Butcher's broom.
- 12- Common Ivy leaves.
- 13- Devil's claw.
- 14- Green tea.
- 15- Red grape seeds.
- 16- Horse chestnut.
- 17- Milk-Thistle fruits.
- 18- Birch.
- 19- Nettle leaves and roots.
- 20- Aloe vera.
- 21- Agnus castus.
- 22- Echinacea.
- 23- Gingko.
- 24- Hops.
- 25- Plantain.
- 26- Uva-ursi.
- 27- Witch hazel.
- 28- Boswellia.
- 29- Guajava leaves.
- 30- Walnut leaves.

