

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Medicinal Chemistry; ALS CHEM DSE 04	4	2	0	2	Appeared in semester V	NIL

Learning Objectives:

The learning objectives of this course are as follows:

- to impart fundamental knowledge on the structure, chemistry, and therapeutic value of drugs.
- to familiarize the structure activity relationships (SAR) of drugs.
- to understand the importance of physicochemical properties and metabolism of drugs.
- to study chemical synthesis of important drugs under each class.

Learning Outcomes:

By studying this course, students will be able to:

- understand the chemistry of drugs with respect to their pharmacological activity.
- explain the drug metabolic pathways, adverse effect and therapeutic value of drugs.
- analyze the Structural Activity Relationship (SAR) of different class of drugs.
- write the chemical synthesis of some drugs.

Unit 1: Basic Principles of Medicinal Chemistry

(10 Hours)

History and development of medicinal Chemistry. Stereochemical aspects: optical, geometrical, conformational, Isosterism. Physiochemical properties: solubility, acid-base, chemical bond, partition coefficient. Drug receptor interaction and International Nonproprietary Names (INNs) of drugs.

Unit 2: Pharmacokinetics

(4 Hours)

ADME: Drug absorption, drug distribution, drug metabolism - Phase 1, Phase 2 metabolism, drug excretion, Drug Half Life.

Unit 3: Medicinally Important Classes of Compounds

(10 Hours)

Introduction, Structure, Synthesis, Therapeutic value and elementary SAR of representative drugs of the following classes:

- Analgesics agent: Ibuprofen
- Antipyretic agent: Paracetamol
- Anti-inflammatory agent: Aspirin
- Antibacterial and antifungal agents: Sulphonamides; Sulphanethoxazol, Sulphacetamide
- Antiviral agent: Acyclovir
- Antibiotics agents: Penicillin, Cephalosporin, Chloromycetin and Streptomycin
- Antileprosy agent: Dapsone

Unit 4: Drugs Acting on Central Nervous System

(6 Hours)

Introduction, structure, therapeutic value and elementary SAR of representative drugs of the following classes:

- Central Nervous System agents: Phenobarbital, Diazepam
- Morphine and related drugs
- Narcotic antagonists: Nalorphine hydrochloride
- Miscellaneous: Cardiovascular (Glyceryl trinitrate), HIV-AIDS related drugs (AZT-Zidovudine)

PRACTICAL

(60 Hours)

1. Preparation of aspirin and its analysis.
2. Preparation of paracetamol and its analysis.
3. Preparation of sulphacetamide of sulphonamide and its analysis.
4. Determination of alcohol contents in liquid drugs/galenical.

5. Determination of ascorbic acid in vitamin C tablets by iodometric or coulometric titrations.
6. Assay of drugs (any two)
 1. Chlorpromazine
 2. Phenobarbitone
 3. Atropine
 4. Ibuprofen
 5. Aspirin

Essential/ Recommended Readings:

1. Patrick, G. (2017), *Introduction to Medicinal Chemistry*, Oxford University Press.
2. Lemke, T. L.; William, D.A.; Roche, V. F.; Zito, S. W. (2012), *Principles of Medicinal Chemistry*, 7th Edition, Wolter Kluwer I Lippincott Williams and Wilkins.
3. Burger, (2021) *Medicinal Chemistry, Drug Discovery and Development*, Vol I to VIII, 8th Edition, Wiley.

Suggestive Reading:

1. Beale, J. M.; Block, J. H. (2010), *Organic Medicinal and Pharmaceutical Chemistry*, 12th Edition, Wolters Kluwer India Pvt. Ltd.
2. Singh H.; Kapoor V.K. (1996), *Medicinal and Pharmaceutical Chemistry*, Vallabh Prakashan.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE COURSE (DSC-06)

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Immunology and Immunotechnology ALS ZOO DSC 06	4	2	0	2	Appeared in semester V	NIL

Learning Objectives:

The learning objectives of this course are as follows:

- to acquaint the students about cells of innate and acquired immune system and their interactions.
- to learn the structure of antibody, different isotypes and their biological functions.
- to acquire knowledge of different types of vaccines.
- to apprise the students of the mechanisms of antigen processing and presentation.
- to train the students in various immunotechniques applied in diagnostics and therapeutics.

Learning Outcomes:

By studying this course, students will be able to:

- have better understanding of the concepts of innate and acquired immunity.
- acquire knowledge of antigenicity and immunogenicity of biomolecules.
- comprehend and analyse different cellular and humoral components of the immune system.

- appreciate the applications of immunotechniques used in diagnostics and therapeutics.

Unit 1: Overview of Immune System (3 Hours)

Historical perspectives of immunology, clonal selection theory, brief outline of immune dysfunctions (hypersensitivity, autoimmunity and immunodeficiency).

Unit 2: Innate and Adaptive Immunity (7 Hours)

Anatomical barriers, inflammation, cells of immune system; adaptive immunity: cell-mediated and humoral, active and passive, natural and artificial.

Unit 3: Antigens (4 Hours)

Antigenicity and immunogenicity; Immunogens: factors influencing immunogenicity; adjuvants and haptens; properties of B and T-cell epitopes.

Unit 4: Immunoglobulins and Vaccines (7 Hours)

Structure and functions of different classes of immunoglobulins, different types of vaccines.

Unit 5: Major Histocompatibility Complex (4 Hours)

Structure and functions of MHC molecules (MHC I and II), endogenous and exogenous pathways of antigen processing and presentation.

Unit 6: Immunotechniques (5 Hours)

Double immunodiffusion assay, haemagglutination assay (ABO typing), immunoelectrophoresis, immunofluorescence, ELISA, hybridoma technology: monoclonal antibodies in therapeutics and diagnosis.

PRACTICAL (60 Hours)

1. Demonstration of lymphoid organs of rat/mouse. (Subject to UGC guidelines).
2. Study of primary and secondary lymphoid organs through slides/photographs/videos.
3. Preparation of stained blood film to study various types of cells.
4. Preparation of serum using rat /mouse (Subject to UGC guidelines).
5. Perform Ouchterlony's double immunodiffusion (DID) to study immunoprecipitation and interpretation of patterns of identity, non-identity and partial identity.
6. Identification of ABO blood group by haemagglutination using antisera.

7. Cell counting and viability test of splenocytes from farm bred animals/cell lines.
8. Demonstration of ELISA and Immuno-electrophoresis.
9. Project on any topic related to theory.

Essential/ Recommended Readings:

1. Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J. (2006). *Immunology*, VI Edition, W.H. Freeman and Company.
2. David, M., Jonathan, B., David, R. B. and Ivan, R. (2006). *Immunology*, VII Edition, Mosby, Elsevier Publication.
3. Punt, J., Stranford, S., Jones, P., Owen J., A. (2018) Kuby Immunology, W H Freeman Publications.

Suggestive readings:

- 1 Abbas, K. Abul and Lechtman H. Andrew (2017) *Cellular and Molecular Immunology*. IX Edition, Saunders Publication.
- 2 Kaur, H., Toteja, R., and Makhija, S. (2021). *Textbook of Immunology*. IK International Publishing House and Wiley India Ltd.

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DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE 04)

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
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Social and Beneficial Insects ALS ZOO DSE 04	4	2	0	2	Appeared in semester V	NIL

Learning Objectives:

The learning objectives of this course are as follows:

- to acquaint students of the social organization found in insects.
- to apprise them of beneficial aspects of insects.
- to impart knowledge about the techniques involved in culturing and rearing of bees, silkworms and lac insect.

Learning Outcomes:

By studying this course, students will be able to:

- identify different types of social and beneficial insects.
- differentiate the various castes and their role in the social life of insects.
- acquire skill for mass rearing of beneficial insects and their products.

Unit 1: Social Insects

(7 Hours)

Characteristics and systematic position. Social organization: caste determination, communication, social parasitism and symbioses, social insect pathogens. Life cycle, social organisation and types of ants, bees, wasps and termites.

Unit 2: Apiculture

(7 Hours)

Habit and habitat of honey bee (*Apis*), bee keeping techniques, bee pasturage, artificial bee hives. Economic importance of bee. Bee enemies, bee diseases and their control.

Unit 3: Sericulture

(6 Hours)

Life cycle of silkworm *Bombyx mori*. Types of silkworm species and their salient features. Rearing techniques of mulberry, muga, eri and tassar silkworms. Enemies and diseases of silkworms and their management.

Unit 4: Lac Culture

(5 Hours)

Habit, habitat and biology of *Laccifera lacca*. Host trees of lac insect, pruning, inoculation and lac harvesting. Enemies of lac insect and their control.

Unit 5: Ecological aspects of beneficial insects

(5 Hours)

Ecological role of insects: pollination, weed control, improving soil fertility and as scavengers. Medicinal use of insects and insect products. Entomophagy.

PRACTICAL

(60 Hours)

1. Study of life cycle of ants, bees, termites, silk worm and lac insect through museum specimens/photographs.
2. Study of different nests build by ants, bees and termites.
3. Construction and maintenance of artificial bee hives and study of equipments related to apiculture.
4. Rearing techniques of mulberry, muga, eri and tassar silkworms.
5. Study of different types of enemies and diseases of silkworms.
6. Study of lac culture technique: pruning, inoculation, cropping and harvesting.
7. Study of economically important insect products.

Essential/Recommended readings:

1. Watson, J. A. L., Okot-Kother, B. M. and Noiroh C. (1985) *Caste differentiation in social insects*. Pergamon Press.
2. Dunston AP. (2007) *The Insects: Beneficial and Harmful Aspects*. Kalyani Publishers., New Delhi.
3. Brian, M. V. (1983) *Social insects: ecology and behavioural biology*. Chapman and Hall, London, New York.
4. D. B. Tembhare (2017) *Modern Entomology*. Himalaya Publishing House.
5. Dokuhon, Z.S. (1998) *Illustrated Textbook on Sericulture*. Oxford & IBH publishing Co., Pvt. Ltd. Calcutta.
6. Shukla, G.S. and Upadhyay, V.B. (2014) *Applied and Economic Zoology*, Rastogi Publications.

Suggestive readings:

1. Maxwell F.G. and Jennings P.R. (Eds). (1980) *Breeding Plants Resistant to Insects*. John Wiley & Sons, New York.
2. *Encyclopedia of Social Insects* (2021) Springer International Publishing.

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