



**ACADEMIC-GRADUATE STUDIES AND RESEARCH DIVISION**

**FIRST SEMESTER 2023-2024**

Course Handout Part II

**Course Number:** PHA G625

**Course title:** Cellular and Molecular Pharmacology

**Instructor In-charge:** Dr. Srinivasa Prasad

**1. Course description:** Cellular and molecular pharmacology deals with understanding the molecular basis for the actions of drugs and the characteristics of interactions between drug molecules and those of the substrates of drug action in the cell. Course will include cellular, molecular, and genetic understanding of the human system, epigenetic disorders, pharmacogenomics and other tools in pharmacology.

**2. Scope and objectives of the course:**

- To give advanced knowledge regarding the molecular and cellular mechanisms involved in the drug action.
- To impart advanced knowledge about the epigenetic changes involved in the disease development.
- To introduce the students to the new field of pharmacogenomics.

**3. Text Book**

- Hardman J. G., Limbird L. E. 2011. "Goodman and Gilman's The Pharmacological Basis of Therapeutics" 12th Ed. McGraw-Hill Professional.
- Textbook of Receptor Pharmacology Foreman John C, Johansen Torben, Boca Raton, CRC Press.
- Epigenetics. Allis, Jenuwein, Reinberg and Caparros. Cold Spring Harbour Laboratory Press. ISBN-13: 978-0879697242 Edition: 1
- The cell: a molecular approach by Geoffrey M. Cooper, 8<sup>th</sup> edition, Oxford university press.

**4. Reference Book**

- H. P. Rang and M. M. Dale, "Pharmacology" 5th Ed. Churchill Livingstone.
- B. G. Katzung, "Basic and Clinical Pharmacology" 9th Ed. McGraw-Hill Medical.
- Harvey R. A, Champe P. C., "Pharmacology-Lippincott's illustrated Reviews" 4th Ed. Lippincott
- Lodish H, Baltimore D, Berk A, Zipursky SL, Matsundaira P and Darnell J. Molecular Cell Biology. WH Freeman & Company, New York. Latest Edition.
- Brown TA. Gene Cloning and DNA Analysis. Blackwell Science, USA. Latest Edition.
- Alberts B, Bray D, Lewis J, Raff M, Roberts K and Watsaon JD, (Eds.) Molecular Biology of the Cell. Garland Publishers, New York. Latest Edition.





7. Muller RF and Youngh ID, (Eds.) Emmerly's Elements of Medical Genetics. Churchill Livingstone, New York. Latest Edition.

**5. Additional reading:**

- Emerging trends and updates have to be obtained from selected journals, it is mandatory to refer the journals and reviews.
- Students must go through the following journals regularly for current research in areas mentioned in the syllabus.
  - a. Epigenetic
  - b. Nature Medicine
  - c. Nature
  - d. Cell
  - e. Science
  - f. Nature Reviews
  - g. Cancer Letters
  - h. Diabetes
  - i. Diabetes Care

**6. Course Plan:**

Lectures	Module	Topics to be covered	Ref	Learning Objective
1-13	Introduction to cell and molecular Biology and Molecular Genetics	Cell and cellular organelles, cytoskeleton, cell death and apoptosis, DNA and genome, flow of genetic information, molecular basis of transcription and protein synthesis.	Text book 4, Ref book 5 and 6	To learn about the basics of cell and organelles and their functions with respect to protein synthesis and protein transport in a cell. Their implications in the human diseases.
14-20	Introduction to epigenetics and epigenetic disorders bioactive molecules	Structure and function of nucleosome, epigenetic modifications, DNA methylation, histone modifications, role of epigenetics in disorders like cancer, diabetes and neurodegenerative disorders	Text book 3, class notes and research articles	To understand the role of different histone modifications, DNA methylation in transcription. Roles of these histone modifications in the development of metabolic diseases



21-30	Molecular mechanism of drug action	Inter and intra cellular signaling, cell surface receptors, GPCRs, tyrosine kinase, nuclear receptors, secondary messengers like cAMP, calcium, MAP kinase, IP3, etc	Text book 3, Class notes and research papers	Understanding the cell signaling and secondary messenger system involved in different diseases
31-34	Pharmacogenomics, Proteomic and genomic tools	Gene sequencing, PCR, immunoassays, metabolomics, nutrigenomics	Class notes, research papers	Understanding the pharmacogenomic, various tools to study the diseases, various fields of “omics”
35-40	Applications of gene therapy in human diseases	Introduction to recombinant DNA technology, types of gene therapy, methods of gene delivery, immunotherapeutics, knockout/knock-in studies in vivo, CRISPR/CAS9 system	Ref book 5, Class notes, review articles	Understanding gene therapy in humans, various modern methods for disease treatments and manipulations

## 7. Evaluation Scheme:

No.	Evaluation Component	Duration	Weight-age (%)	Date & Time	Nature of Component
1	Surprise quizzes	15 min each	20	Before mid-term	CB
2	Mid Sem Examination	90 min	25	11/10 4.00 - 5.30PM	CB
3	Continuous assessments/seminar	variable	20	After mid-term	OB – 20%
4	Comprehensive Exam	120min	35	13/12 AN	CB – 15% and OB – 20%

**Attendance:** Although attendance is not compulsory, regularity in theory classes will be decisive factor during grading, especially in borderline cases.

**Chamber Consultation Hour:** To be announced in the class.

**Make-up policy:** Generally, make-up will be considered for regular students only (80% attendance in lecture classes). It is solely dependent on the “genuineness” of the circumstances. The make-up application should be personally given to instructor-in-charge. No makeup will be granted for Assignments/Quizzes under any circumstances.



**Notices:** Concerning this course will be displayed on Pharmacy Dept. notice board only.

**Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Instructor In charge**

**PHA G625**

Date: 28-07-2023

