



# MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001 (PUNJAB), INDIA

(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)

Department: Pharmaceutical Sciences & Technology

Program: M. Pharmacy (Pharmacology)

## COURSE ARTICULATION MATRIX (STUDY SCHEME: 2017)

| Subject                                     | S Code  | Semester | Credit | Duration (Hrs) | L T P | COs  | Statement                                                            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6      | PSO1     | PSO2 | PSO3 | PSO4 | PSO5     | PSO6 |
|---------------------------------------------|---------|----------|--------|----------------|-------|------|----------------------------------------------------------------------|-----|-----|-----|-----|-----|----------|----------|------|------|------|----------|------|
| Modern Pharmaceutical Analytical Techniques | MPL101T | 1        | 4      | 60             | 4 0 0 | CO1  | Chemicals and Excipients                                             | 2   | 3   | 1   | 2   | 2   | 2        |          |      |      |      |          | 2    |
|                                             |         |          |        |                |       | CO2  | The analysis of various drugs in single and combination dosage forms | 3   | 2   | 1   | 2   | 2   | 3        | 2        |      | 2    |      |          | 3    |
|                                             |         |          |        |                |       | CO3  | Theoretical and practical skills of the instruments                  | 2   | 3   | 1   | 2   | 2   | 2        |          |      | 2    |      |          | 3    |
|                                             |         |          |        |                |       | Avg. |                                                                      |     |     |     |     |     | 2.333333 | 2.666667 | 1    | 2    | 2    | 2.333333 | 2    |

|                                  |         |      |   |    |       |     |                                                                                                            |  |          |          |  |   |          |   |          |  |  |  |          |
|----------------------------------|---------|------|---|----|-------|-----|------------------------------------------------------------------------------------------------------------|--|----------|----------|--|---|----------|---|----------|--|--|--|----------|
| Advanced Pharmacology-I          | MPL102T | 1    | 4 | 60 | 4 0 0 | CO1 | Discuss the pathophysiology and pharmacotherapy of certain diseases                                        |  | 2        | 2        |  |   | 2        | 2 | 2        |  |  |  | 2        |
|                                  |         |      |   |    |       | CO2 | Explain the mechanism of drug actions at cellular and molecular level                                      |  | 3        | 2        |  | 1 | 2        | 2 | 1        |  |  |  | 2        |
|                                  |         |      |   |    |       | CO3 | Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases |  | 2        | 3        |  | 1 | 3        | 2 | 2        |  |  |  | 3        |
|                                  |         | Avg. |   |    |       |     |                                                                                                            |  | 2.333333 | 2.333333 |  | 1 | 2.333333 | 2 | 1.666667 |  |  |  | 2.333333 |
| Toxicological Screening Methods- | MPL103T | 1    | 4 | 60 | 4 0 0 | CO1 | Appraise the regulations and ethical requirement for the usage of experimental animals.                    |  | 1        | 2        |  |   | 2        |   | 2        |  |  |  | 2        |

|                                     |         |   |   |    |     |     |                                                                                                                                                   |   |          |     |   |   |      |   |   |   |  |      |
|-------------------------------------|---------|---|---|----|-----|-----|---------------------------------------------------------------------------------------------------------------------------------------------------|---|----------|-----|---|---|------|---|---|---|--|------|
|                                     |         |   |   |    |     | CO2 | Describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals |   | 2        | 2   | 3 | 1 | 3    | 2 |   |   |  | 3    |
|                                     |         |   |   |    |     | CO3 | Describe the various newer screening methods involved in the drug discovery process                                                               |   | 2        | 3   |   | 1 | 3    |   |   | 3 |  | 3    |
|                                     |         |   |   |    |     | CO4 | Appreciate and correlate the preclinical data to humans                                                                                           | 2 |          | 3   |   |   | 3    | 2 | 2 |   |  | 3    |
| Avg.                                |         |   |   |    |     |     |                                                                                                                                                   | 2 | 1.666667 | 2.5 | 3 | 1 | 2.75 | 2 | 2 | 3 |  | 2.75 |
| Cellular and Molecular Pharmacology | MPL104T | 1 | 4 | 60 | 400 | CO1 | Explain the receptor signal transduction processes.                                                                                               |   | 2        | 2   |   |   | 2    | 2 |   |   |  | 2    |
|                                     |         |   |   |    |     | CO2 | Explain the molecular pathways affected by drugs.                                                                                                 |   | 3        | 2   |   |   | 2    |   |   | 2 |  | 2    |

|                          |         |   |   |     |     |     |                                                                                                 |   |     |   |  |   |      |   |   |   |   |      |
|--------------------------|---------|---|---|-----|-----|-----|-------------------------------------------------------------------------------------------------|---|-----|---|--|---|------|---|---|---|---|------|
|                          |         |   |   |     |     | CO3 | Appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process |   | 3   | 3 |  | 1 | 3    | 2 |   |   |   | 3    |
|                          |         |   |   |     |     | CO4 | Demonstrate molecular biology techniques as applicable for pharmacology                         | 1 | 2   | 1 |  |   | 2    |   | 2 |   |   | 2    |
| Avg.                     |         |   |   |     |     |     |                                                                                                 | 1 | 2.5 | 2 |  | 1 | 2.25 | 2 | 2 | 2 |   | 2.25 |
| Pharmacology Practical I | MPL105P | 1 | 6 | 180 | 006 | CO1 | Able to perform handling of experimental animals.                                               |   | 2   | 3 |  |   | 2    |   |   | 3 |   | 2    |
|                          |         |   |   |     |     | CO2 | To study techniques of blood sampling, anesthesia and euthanasia of experimental animals.       |   | 1   | 2 |  |   | 2    |   |   | 1 | 2 | 2    |
|                          |         |   |   |     |     | CO3 | To perform different functional observation battery tests.                                      |   | 1   | 1 |  |   | 1    |   | 2 | 3 |   | 1    |

|                          |         |   |   |    |     |     |                                                                                                        |   |   |   |   |   |     |   |   |   |   |     |   |
|--------------------------|---------|---|---|----|-----|-----|--------------------------------------------------------------------------------------------------------|---|---|---|---|---|-----|---|---|---|---|-----|---|
|                          |         |   |   |    |     | CO4 | To evaluate activity of compounds belonging to different classes of drugs.                             | 1 | 2 | 2 | 1 | 1 | 2   |   |   |   | 2 |     | 2 |
|                          |         |   |   |    |     | CO5 | Appraise the regulations and ethical requirement for the usage of experimental animals.                | 1 | 1 | 1 | 2 | 2 | 2   |   |   |   | 2 |     | 2 |
|                          |         |   |   |    |     | CO6 | Able to understand the theoretical and practical skills of the instruments of Pharmacology laboratory. | 1 | 2 | 1 |   |   | 2   | 3 |   |   |   |     | 2 |
| Avg.                     |         |   |   |    |     |     |                                                                                                        | 1 | 1 | 2 | 1 | 2 |     |   |   |   |   |     | 1 |
|                          |         |   |   |    |     |     |                                                                                                        |   |   |   |   |   | 1.5 | 2 | 3 | 2 | 1 | 2.4 |   |
| Advanced Pharmacology II | MPL201T | 2 | 4 | 60 | 400 | CO1 | Explain the mechanism of drug actions at cellular and molecular level                                  |   | 3 | 2 |   | 1 | 2   | 2 | 2 |   |   |     | 2 |
|                          |         |   |   |    |     | CO2 | Discuss the Pathophysiology and pharmacotherapy of certain diseases                                    |   | 2 | 1 |   | 1 | 2   | 2 | 1 |   |   |     | 2 |

|                                           |         |   |   |    |     |     |                                                                                                            |  |          |          |   |   |          |   |          |   |          |          |          |
|-------------------------------------------|---------|---|---|----|-----|-----|------------------------------------------------------------------------------------------------------------|--|----------|----------|---|---|----------|---|----------|---|----------|----------|----------|
|                                           |         |   |   |    |     | CO3 | Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases |  | 3        | 3        |   |   | 3        | 2 | 2        |   |          |          | 3        |
| Avg.                                      |         |   |   |    |     |     |                                                                                                            |  | 2.666667 | 2        |   | 1 | 2.333333 | 2 | 1.666667 |   |          |          | 2.333333 |
| Pharmacological & Toxicological Screening | MPL202T | 2 | 4 | 60 | 400 | CO1 | Explain the various types of toxicity studies                                                              |  | 1        | 2        |   |   | 3        | 1 |          |   | 3        |          | 3        |
|                                           |         |   |   |    |     | CO2 | Appreciate the importance of ethical and regulatory requirements for toxicity studies                      |  | 2        | 2        |   |   | 3        |   | 2        |   | 2        |          | 2        |
|                                           |         |   |   |    |     | CO3 | Demonstrate the practical skills required to conduct the preclinical toxicity studies                      |  | 2        | 3        |   | 1 | 3        |   |          | 2 | 2        |          | 3        |
| Avg.                                      |         |   |   |    |     |     |                                                                                                            |  | 1.666667 | 2.333333 |   | 1 | 3        | 1 | 2        | 2 | 2.333333 | 1.666667 | 2.333333 |
| Principles of Drug Discovery              | MPL202T | 2 | 4 | 60 | 400 | CO1 | Explain the various stages of drug discovery                                                               |  | 3        | 2        | 1 | 2 | 2        |   | 1        | 3 |          |          | 2        |



|                           |         |   |   |     |       |     |                                                                                            |   |          |   |  |  |     |  |   |   |   |          |
|---------------------------|---------|---|---|-----|-------|-----|--------------------------------------------------------------------------------------------|---|----------|---|--|--|-----|--|---|---|---|----------|
|                           |         |   |   |     |       | C03 | Explain the responsibilities of key players involved in clinical trials                    |   | 1        |   |  |  |     |  |   | 3 |   | 2        |
|                           |         |   |   |     |       | C04 | Execute safety monitoring, reporting and close-out activities                              |   | 1        |   |  |  |     |  |   | 2 |   | 3        |
|                           |         |   |   |     |       | C05 | Explain the principles of Pharmacovigilance                                                |   | 2        |   |  |  |     |  |   | 3 |   | 2        |
|                           |         |   |   |     |       | C06 | Detect new adverse drug reactions and their assessment                                     |   | 2        |   |  |  | 1   |  |   |   |   | 3        |
|                           |         |   |   |     |       | C07 | Perform the adverse drug reaction reporting systems and communication in Pharmacovigilance |   | 2        |   |  |  |     |  |   | 3 |   | 3        |
| Avg.                      |         |   |   |     |       |     |                                                                                            |   | 1.571429 | 2 |  |  | 1.5 |  | 2 | 3 |   | 2.714286 |
| Pharmacology Practical II | MPL205P | 2 | 6 | 180 | 0 0 6 | C01 | To appraise the regulations and ethical requirement for the usage of experimental animals. |   | 1        | 3 |  |  | 2   |  |   |   | 3 | 3        |
|                           |         |   |   |     |       | C02 | To understand and evaluate different samples using bioassays.                              | 1 | 1        | 2 |  |  | 1   |  |   |   | 3 | 3        |

|      |  |  |  |  |  |     |                                                                                           |   |      |      |  |  |   |   |  |   |   |  |   |
|------|--|--|--|--|--|-----|-------------------------------------------------------------------------------------------|---|------|------|--|--|---|---|--|---|---|--|---|
|      |  |  |  |  |  | CO3 | To record and analyze the DRC, ECG and strength of unknown sample.                        | 1 | 2    | 1    |  |  | 2 |   |  | 2 |   |  | 3 |
|      |  |  |  |  |  | CO4 | To demonstrate the practical skills required to conduct the preclinical toxicity studies. | 1 | 1    | 3    |  |  | 3 | 3 |  | 2 |   |  | 3 |
| Avg. |  |  |  |  |  |     |                                                                                           | 1 | 1.25 | 2.25 |  |  | 2 | 3 |  | 2 | 3 |  | 3 |

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low) - upto 30%

2. Moderate (Medium) – above 30% and upto 70%

3. Substantial (High) – above 70%

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So on..... (1<sup>st</sup> semester to last semester)