

3. Course Specification: Cardiac Pharmacology (CPPM 703)

I. General Information:

Field	Details
1. Course Title	Cardiac Pharmacology
2. Course Code	CPPM 703
3. Credit Hours	3
4. Contact Hours	4.5 (3 Theoretical + 1.5 Practical)
5. Level/ Semester	Master's / First Semester
6. Prerequisite (if any)	Advanced Cardiovascular Physiology and Anatomy (CPPM 701) - <i>Suggested</i>
7. Program(s) in which the Course is Offered	Master of Cardiopulmonary Perfusion
8. Language of Teaching the Course	English
9. Prepared by	
10. Date of Approval	October 2025

II. Course Description:

This course provides an in-depth study of the pharmacologic agents used in the management of cardiac patients, particularly in the perioperative and critical care settings. The focus is on the mechanisms of action, pharmacokinetics, pharmacodynamics, dosage calculation, and safe administration of vasoactive drugs, anticoagulants, antiarrhythmics, and agents used for myocardial protection during cardiopulmonary bypass.

III. Course Intended Learning Outcomes (CILOs):

CILOs	Referenced PILOs (I, P, M/A)
A. Knowledge and Understanding:	
a1 Describe the mechanisms of action and physiological effects of major vasoactive drugs on the cardiovascular system.	M/A (A1)
a2 Explain the pharmacokinetics and pharmacodynamics of drugs when administered into the CPB circuit.	M/A (A2)
a3 Identify common drug interactions and adverse effects relevant to the cardiac surgical patient.	M/A (A3)
B. Intellectual Skills:	
b1 Analyze patient hemodynamic status and select the most appropriate pharmacological intervention to optimize perfusion.	M/A (B1)
b2 Evaluate the efficacy of administered drugs based on continuous patient monitoring data and adjust the therapeutic plan accordingly.	M/A (B2)
C. Professional and Practical Skills:	
c1 Accurately calculate drug dosages and prepare solutions for intravenous administration.	M (C1)
c2 Apply strict protocols for the safe handling and administration of high-alert medications in the operating room environment.	M (C2)
D. Transferable Skills:	
d1 Utilize smart infusion pump technology for precise drug delivery and demonstrate an understanding of medication safety systems.	M (D1)
d2 Communicate clearly and concisely the drug administration details and patient response to the anesthesia and surgical team.	P (D3)

IV. Course Contents:

Main Topic	Subtopics	Week	Hours	Aligned CILOs
1. Pharmacological Principles in CPB	Pharmacokinetics/Pharmacodynamics in Hemodilution, Drug Distribution in the CPB Circuit.	1-2	4	a2, c1
2. Vasoactive Drugs	Inotropes, Vasopressors, Vasodilators - Mechanisms and Dosing.	3-5	6	a1, b1
3. Anticoagulation and Hemostasis	Heparin, Protamine, Antifibrinolytics (TXA), Management of Coagulopathy and Bleeding.	6-7	4	a2, c2
4. Drugs for Myocardial Protection	Pharmacological Components of Cardioplegia Solutions, Adjunctive Agents.	9-10	4	a2, b1
5. Antiarrhythmics and Anesthetics	Mechanisms and Use of Antiarrhythmics, Basic Principles of Anesthetic Agents during CPB.	11-12	4	a1, a3
6. Medication Safety and Emergency	Drug Interactions, High-Alert Medications, Management of Cardiac Emergencies (ACLS drugs), Smart Pump Technology.	13-14	4	a3, b2, d1

V. Teaching and Learning Resources:

Category	Resources
Core Textbooks	1. Goodman & Gilman's The Pharmacological Basis of Therapeutics (Latest Edition). <i>McGraw Hill</i> . 2. Katzung & Trevor's Basic & Clinical Pharmacology (Latest Edition). <i>McGraw Hill</i> .



Supplementary Texts	1. Stoelting's Pharmacology & Physiology in Anesthetic Practice (Latest Edition). <i>Lippincott Williams & Wilkins</i> . 2. Clinical Perfusion for Cardiac Surgery: A Step-by-Step Guide to the Fundamentals by James DiNardo (2025). <i>Springer</i> .
Journals & Databases	Journal of Cardiothoracic and Vascular Anesthesia, Critical Care Medicine, PubMed, Scopus.