2. Course Specification: Fundamentals of Cardiac Perfusion (CPPM 702)

I. General Information:

Field	Details
1. Course Title	Fundamentals of Cardiac Perfusion
2. Course Code	CPPM 702
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) - *Suggested*
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 core course introduces the fundamental principles, equipment, and clinical practices of cardiopulmonary bypass (CPB). Students will gain a deep understanding of the CPB circuit components, anticoagulation management, myocardial protection strategies, and the physiological management of the patient during CPB. The course emphasizes the practical skills required for safe and effective perfusion delivery.

III. Course Intended Learning Outcomes (CILOs):

CILOs	**Referenced PILOs (I, P, M/A)**
A. Knowledge and Understanding:	
a1 Describe the function, operation, and maintenance of all components of the CPB circuit.	M/A (A1)
a2 Explain the procedures for safe initiation, maintenance, and termination of cardiopulmonary bypass.	M/A (A2)
a3 Demonstrate knowledge of different myocardial protection techniques and solutions (Cardioplegia).	M/A (A3)
B. Intellectual Skills:	
b1 Analyze and interpret patient physiological and hematological data to make immediate adjustments during CPB.	M/A (B1)
b2 Evaluate potential CPB complications and formulate rapid, effective management plans.	M/A (B2)
C. Professional and Practical Skills:	
c1 Demonstrate the ability to assemble, prime, and de-air the CPB circuit in a simulated environment.	M (C1)
c2 Apply protocols for anticoagulation management, including accurate calculation and administration of Heparin and Protamine.	M (C2)
D. Transferable Skills:	
d1 Collaborate effectively with the surgical, anesthesia, and nursing teams, maintaining clear communication.	M (D1)
d2 Maintain accurate and detailed perfusion records and documentation according to professional standards.	P (D3)

IV. Course Contents:

Main Topic	Subtopics	Week	Hours	Aligned CILOs
1. Introduction to CPB	History, Indications, Contraindications, Types of Circuits, Cannulation Techniques.	1-2	4	a1, a2
2. CPB Components	Pumps (Roller/Centrifugal), Oxygenators, Heat Exchangers, Reservoirs, Filters.	3-4	4	a1
3. Anticoagulation Management	Heparinization, Protamine Reversal, ACT Monitoring, Hemostasis and Blood Conservation.	5-6	4	a2, c2
4. Myocardial Protection	Principles of Cardioplegia, Solutions, Routes of Delivery, Ischemic Preconditioning.	7-9	6	a3, b1
5. Patient Management During CPB	Flow and Pressure Management, Temperature Control, Blood Gas and Acid-Base Management, Fluid and Electrolyte Balance.	10-12	6	a2, b1
6. Complications and Emergencies	Air Embolism, Pump Failure, Massive Bleeding, Management of Critical Incidents, Weaning from CPB.	13-14	4	b2, d1

V. Teaching and Learning Resources:

Category	Resources
Core Textbooks	1. **Clinical Perfusion for Cardiac Surgery: A Step-by-Step Guide to the Fundamentals** by James DiNardo (2025). *Springer*. 2. **Perfusion: A Quick Reference Guide** by John H. Artrip (Latest Edition). *Springer*.

Supplementary Texts	1. **Cardiovascular Perfusion: Protocols and Guidelines** (Latest Edition). 2. **The Essentials of Perfusion** by D. G. T. Jones (Latest Edition). *Elsevier*.
Journals & Databases	Journal of ExtraCorporeal Technology (JECT), Perfusion, PubMed, Scopus.