

Course Specifications for First Semester - Master of Cardiopulmonary Perfusion

Program Based on the CAQA-Yemen Course Specification Template

1. Course Specification: Advanced Cardiovascular Physiology and Anatomy (CPPM 701)

I. General Information:

| Field | Details |
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| 1. Course Title | Advanced Cardiovascular Physiology and Anatomy |
| 2. Course Code | CPPM 701 |
| 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) | None (Foundational Course) |
| 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 advanced course provides a comprehensive and in-depth study of the anatomical structures and physiological functions of the cardiovascular system, with a specific focus on aspects critical to cardiopulmonary perfusion. The course covers cellular electrophysiology, advanced hemodynamics, pulmonary circulation, and the pathophysiology of major cardiac and vascular diseases, preparing students to understand the physiological basis of cardiopulmonary bypass (CPB) and related interventions.

III. Course Intended Learning Outcomes (CILOs):

| CILOs | Referenced PILOs (I, P, M/A) |
|--|------------------------------------|
| A. Knowledge and Understanding: | |
| a1 Describe the intricate anatomical structures of the heart, coronary circulation, and major blood vessels relevant to surgical cannulation and CPB. | M/A (A1) |
| a2 Explain the advanced physiological mechanisms of myocardial contraction, cellular electrophysiology, and the regulation of cardiac output and blood pressure. | M/A (A2) |
| a3 Demonstrate a broad understanding of the pathophysiology of common cardiac conditions and their impact on perfusion. | M/A (A3) |
| B. Intellectual Skills: | |
| b1 Analyze complex physiological data to assess cardiac function and the need for mechanical support. | M/A (B1) |
| b2 Interpret the physiological consequences of CPB (e.g., hemodilution, hypothermia, inflammatory response) to guide perfusion management decisions. | M/A (B2) |
| C. Professional and Practical Skills: | |
| c1 Apply anatomical knowledge to identify and verify sites for monitoring and cannulation in simulated CPB scenarios. | P (C1) |
| c2 Demonstrate the ability to interpret advanced diagnostic data such as ECGs and cardiac catheterization reports. | P (C2) |
| D. Transferable Skills: | |
| d1 Communicate effectively using specialized medical and physiological terminology with the surgical and perfusion team members. | M (D1) |

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| d2 Engage in self-directed learning and critical appraisal of scientific literature related to cardiovascular physiology. | M (D3) |
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IV. Course Contents:

| Main Topic | Subtopics | Week | Hours | Aligned CILOs |
|--|---|-------|-------|---------------|
| 1. Foundational Anatomy & Electrophysiology | Review of Basic Anatomy, Coronary Circulation, Conduction System, Cellular Electrophysiology. | 1-3 | 6 | a1, a2, c2 |
| 2. Advanced Hemodynamics & Regulation | Starling's Law, Pressure-Volume Loops, Regulation of Cardiac Output, Neuro-Hormonal Control, Mechanisms of Shock. | 4-6 | 6 | a2, b1 |
| 3. Pathophysiology of Heart Disease | Heart Failure, Valvular Heart Diseases, Coronary Artery Disease, Congenital Defects. | 7-9 | 6 | a3, b2 |
| 4. Applied Physiology for CPB | Pulmonary Circulation, Physiological Effects of Hypothermia/Rewarming, Systemic Inflammatory Response to CPB. | 10-12 | 6 | a2, b2, d2 |
| 5. Organ Protection & Mechanical Support | Myocardial Protection (Physiological Basis), Cerebral Perfusion, Principles of Mechanical Circulatory Support (VADs, ECMO). | 13-14 | 4 | a3, b1, d1 |

V. Teaching and Learning Resources:

| Category | Resources |
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| Core Textbooks | 1. Berne & Levy Physiology (Latest Edition). <i>Elsevier</i> . 2. Ganong's Review of Medical Physiology (Latest Edition). <i>McGraw Hill</i> . |
| Supplementary Texts | 1. Advanced Cardiovascular Exercise Physiology (Latest Edition). <i>Human Kinetics</i> . 2. Clinical Perfusion for Cardiac Surgery: A Step- |



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| | by-Step Guide to the Fundamentals by James DiNardo (2025). <i>Springer</i> . |
| Journals & Databases | Journal of ExtraCorporeal Technology (JECT), Circulation, American Journal of Physiology, PubMed, Scopus. |