



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

COMMON COURSE NUMBER: CVT 1200

COURSE TITLE: CARDIOPULMONARY PHARMACOLOGY

CREDIT HOURS: 3

CREDIT HOUR BREAKDOWN:

Lecture/Discussion: 3

Laboratory:

Other:

CATALOG COURSE DESCRIPTION:

This course provides an overview of drugs in relation to the cardiopulmonary system with special emphasis on the drugs used to treat cardiac and pulmonary patients.

PREREQUISITE(S): ACCEPTANCE INTO CARDIO/RESPIRATORY PROGRAMS
RET 1485

COREQUISITE: None

UNIT TITLES:

1. **Definitions, terms and regulatory agencies**
2. **Drug delivery routes**
3. **Calculations**
4. **Autonomic nervous system**
5. **Pharmacologic control of airway caliber**
6. **Pharmacologic control of inflammation**
7. **Pharmacologic control of infection**
8. **Pharmacologic control of cardiac anomalies**
9. **Pharmacologic control of cardiovascular function**
10. **Pharmacologic control of blood viscosity**
11. **Drugs affecting the Central Nervous System**
12. **Pharmacologic control of drug reactions**

I. Course Overview:

Upon successful completion of this course, the students should be able to understand concepts associated with the administration of drugs used in the treatment of cardiopulmonary disorders.

II. Units

Unit 1. **Definitions, Terms, Regulatory Agencies**

General Outcomes:

- 1.0 The student will define all of the terms commonly used in the administration of drugs and will describe the role of the primary drug regulatory agencies.

SPECIFIC LEARNING OUTCOMES:

To successfully complete this unit, the student will:

- 1.1 Define all of the following terms as they relate to the administration of drugs:

Pharmacology	Pharmacokinetic	Pharmacodynamic
Drug	Additive	Synergism
Potentiation	Antagonism	Tolerance
Cumulation	Tachyphylaxis	Anaphylaxis
Chemical Name	Generic Name	Trade Name

- 1.2 Identify the role of the FDA and USP in drug regulation.

Unit 2. Drug Delivery Routes

General Outcome:

- 2.0 The student will identify the primary routes of drug administration, metabolism, storage, and elimination in the body.

SPECIFIC LEARNING OUTCOMES:

To successfully complete this unit, the student will:

- 2.1 Identify the advantages and disadvantages of each of the following routes of drug administration: oral, topical, intravenous, intramuscular, and aerosol.
- 2.2 Identify the role of the liver, kidney and stomach in drug metabolism, and elimination.
- 2.3 Describe the proper technique to obtain optimal particle deposition in the lung
- 2.4 Identify different devices for aerosol inhalation
- 2.5 Identify the components of an intravenous delivery system
- 2.6 Describe the effects of tubing size on delivering medication
- 2.7 Explain the use of different diluents, i.e. D₅W versus saline
- 2.8 Describe the mechanism for preventing bloodclots from occluding an indwelling catheter

Unit 3. **Calculations**

General Outcomes:

- 3.0 The student will accurately perform calculations necessary to the administration of drugs.

SPECIFIC LEARNING OUTCOMES:

To successfully complete this unit, the student will:

- 3.1 Accurately calculate the new drug strength when given drug strength and volume of diluent.
- 3.2 Accurately calculate the amount of diluent necessary to effect a desired change in drug strength.
- 3.3 Convert percent concentrations to volume mixtures.
- 3.4 Convert gram: volume ratios into milligrams/milliliter (1:10,000,etc)
- 3.5 Convert the following:
- | | |
|-----------------------|----------------------|
| Minims to Milliliters | Grams to Milligrams |
| Liters to Milliliters | Decimals to Percents |
- 3.6 Calculate dosage schedules per body weight
- 3.7 Accurately calculate an intravenous solution infusion dosage
- 3.6a Calculate the concentration of the solution
- 3.6b Calculate the infusion rate in drops/min
- 3.6c Calculate the infusion rate in ml/hr

Unit 4. Autonomic Nervous System

General Outcomes:

- 4.0 The student will describe the role and function of the autonomic nervous system in the regulation of cardio-respiratory physiology.

SPECIFIC LEARNING OUTCOMES:

To successfully complete this unit, the student will:

- 4.1 Describe the structure of the autonomic nervous system, including both sympathetic and parasympathetic branches.

- 4.2 Identify the role and function of the following neuro-transmission substances:

Epinephrine	Cholinesterase
Norepinephrine	Phosphodiesterase
Acetylcholine	

- 4.3 The student will describe the physiologic response to:

Sympathomimetics	Parasympathomimetics
Sympatholytics	Parasympatholytics

- 4.4 Describe the role of depolarization and repolarization in the contraction and relaxation of muscle tissue.

Unit 5. Pharmacological Control of Airway Caliber

General Outcome:

- 5.0 The student will describe the function and mode of operation of bronchodilators, mucolytics, surface-active agents and steroidal and nonsteroidal anti-inflammatory agents in airway control.

SPECIFIC LEARNING OUTCOMES:

To successfully complete this unit, the student will:

- 5.1 For each of the drugs listed below, describe:

Mechanism of Action
Preferred Route of Administration
Adverse Side Effects
Trade Names
Drug Classification

Atropine	Ipratropium Bromide
Theophylline	Epinephrine
Racemic Epinephrine	Beclomethasone
Isoetharine	Metaproterenol
Terbutaline	Albuterol
Acetylcysteine	Saline
Sodium Bicarbonate	Distilled Water
Cromolyn Sodium	Triamcinalone

- 5.2 Describe the clinical advantages of sympathomimetic, parasympatholytic, and methylxanthine bronchodilators.
- 5.3 Describe when the three groups of bronchodilators can be used in combination.
- 5.4 Describe the function of goblet cells and submucosal glands in mucus production.
- 5.5 Describe the structure and function of mucus and the mucociliary escalator.
- 5.6 Describe the changes which occur in the mucociliary escalator in the presence of chronic airway inflammation.
- 5.7 Compare and contrast the efficacy of systemic and topical hydration.
- 5.8 Define surface tension.
- 5.9 Describe the effect that narrowed or obstructed airways have on ventilation and gas exchange.
- 5.11 Describe the role and function of the mast cell in the inflammatory process.
- 5.12 Differentiate the pathogenesis of allergic and nonallergic asthma.

Unit 6. Control of Inflammation

General Outcome:

- 6.0 The student will describe the role of inflammation in disease and the pharmacologic control of the process.

SPECIFIC LEARNING OUTCOMES:

To successfully complete this unit, the student will:

- 6.1 Describe the body's response to inflammation.
6.2 Describe the role of corticosteroids in the treatment of chronic airway inflammation.
6.3 Describe the advantages of aerosolized versus orally or parenterally administered corticosteroids in the treatment of chronic airway inflammation.
6.4 List the short term and long term hazards of corticosteroid use.

For each of the drugs listed below, describe the indications, mechanism of action, the adverse side effects, the preferred route of administration and the prescribed dosages:

Solucortef	Azmacort
Methyl Prednisolone	Aerobid
Prednisone	Vanceril
Solumedrol	Flovent

Unit 7. Pharmacological Control of Infection

General Outcome:

- 7.0 The student will describe the function and mode of operation of antibacterial, antifungal and antiviral agents used to treat respiratory infections.

SPECIFIC LEARNING OUTCOMES:

To successfully complete this unit, the student will:

- 7.1 Define the terms antibiotic, bacteriostatic and bacteriocidal.
- 7.2 List and describe the four methods whereby antibiotics act.
- 7.3 Describe the role of resistant organisms in antimicrobial therapy
- 7.4 For each of the antibiotic groups listed below, describe:

Mechanism of Action
Preferred Route of Administration
Adverse Side Effects
Trade Names
Drug Classification

Penicillins	Cephalosporins
Aminoglycosides	Tetracyclines
Flouroquinolones	Vancomycin
Macrolides	Sulfonamides
Amphotericin B	Nystatin
Ribavirin	Isoniazid
Zidovudine	Rifampin

Unit 8. Pharmacological Control of Cardiac Anomalies

General Outcome:

- 8.0 The student will describe the role and function of pharmacologic agents used in the treatment of cardiac dysfunction.

SPECIFIC LEARNING OUTCOME:

To successfully complete this unit, the student will:

- 8.1 Describe the primary causes of bradycardia, tachycardia, conduction defects, and ectopic beats.
- 8.2 Define inotropy and chronotropy.
- 8.3 For each of the drugs listed below, describe:
Mechanism of Action
Preferred Route of Administration
Dosage
Adverse Side Effects
Trade Names
Drug Classification

Phenytoin	Lidocaine
Propranolol (Inderal)	Bretyllium (Bretylol)
Verapamil	Calcium Chloride
Atropine	Potassium Chloride
Enalapril (Vasotec)	Esmolol (Brevibloc)
Adenosine (Adenocard)	Digitalis (Digoxin)
Diltiazem (Cardizem)	Nifedepine (Procardia)
Amrinone (Inocor)	

- 8.4 Describe the drugs used during resuscitation of the cardiac arrest patient or impending cardiac arrest patient
- 8.5 For each of the drugs listed, describe:
It's role during CPR
Concentration of the drug
Preferred route of administration
Dosage
Adverse side effects
Drug compatibilities

Epinephrine	Sodium Bicarbonate
Atropine	Isuprel

Unit 9. Pharmacological Control of Cardiovascular Function

General Outcomes:

- 9.0 The student will describe the role and function of diuretic, vasoactive and antihypertensive agents in the treatment of blood pressure abnormalities and fluid imbalance.

SPECIFIC LEARNING OUTCOMES:

To successfully complete this unit, the student will:

- 9.1 Define and describe hypervolemia and hypovolemia.
- 9.2 Describe the effects of diuretics on the kidney
- 9.3 Describe the different mechanisms for anti-hypertensive therapy
- 9.4 Describe the different mechanisms for control of hypotension
- 9.5 Explain how the pharmacologic mechanisms for coronary vasodilation is achieved
- 9.6 Describe the method of inducing coronary vasoconstriction for diagnostic testing
- 9.7 For each of the drugs listed below, describe:

Mechanism of Action

Preferred Route of Administration

Drug Classification

Trade Names

Adverse Side Effects

Dosages

Thiazide		Spironolactone
Furosemide		Hydralazine
Mannitol		Reserpine
Bumetadine (Bumex)		Enalapril (Vasotec)
Ergonovine		Dopamine
Nitroprusside		Dobutamine
Nitroglycerine		Esmolol (Brevibloc)
Osmitol		

Unit 10. Pharmacologic Control of Blood Viscosity

General Outcomes:

- 10.0 The student will describe the role and function of anticoagulants, thrombolytics and antiplatelets in the treatment of coagulopathies.

SPECIFIC LEARNING OUTCOMES:

To successfully complete this unit, the student will:

- 10.1 Describe the pathogenesis of thromboembolism formation.
- 10.2 Describe the clinical significance of thromboemboli.
- 10.3 Differentiate between anticoagulant and thrombolytic drugs
- 10.4 Describe the pathogenesis of atherosclerosis as it relates to occlusion of coronary vessels
- 10.5 Describe the application of thrombolytics with acute myocardial infarct
- 10.6 Describe the use of antiplatelets with stent usage
- 10.7 Describe the mechanism of reversing the effects of heparin
- 10.8 For each of the drugs listed below, the student will describe:

Indications	Mechanism of Action
Preferred Route of Administration	
Adverse Side Effects	Trade Names
Drug Classifications	

Sodium Heparin	Warfarin	Streptokinase
Dicumarol	Urokinase	Tissue Plasminogen Activator
Ticlid	Lovenox	Persantine
Protamine	Reapro	Plavix

Integrilin

Unit 11. Drugs Affecting the Central Nervous System

General Outcome:

- 11.0 The student will describe the role and function of narcotic and non-narcotic analgesics in the management of pain, sedation and muscle paralysis

SPECIFIC LEARNING OBJECTIVES:

To successfully complete this unit, the student will:

- 11.1 Describe the neural pathways of pain impulses.
- 11.2 Describe the clinical significance of pain and its effect on other body functions.
- 11.3 Explain the rationale for using narcotic versus non-narcotic analgesia.
- 11.4 Describe the clinical manifestations and treatment of narcotic and non-narcotic analgesic overdose.
- 11.5 For each of the drugs listed below, the student will describe:

Indications
Mechanism of Action
Preferred Route of Administration
Adverse Side Effects
Trade Names
Drug Classifications

Morphine	Codeine	Pancuronium Bromide (Pavulon)
Naloxone	Meperidine	Norcuron
Acetaminophen	Hydromorphone	Mivracon
Ibuprofen	Acetylsalicylic Acid	Diazepam (Valium)
	Indomethacin	Midazolam (Versed)

Unit 12. Pharmacologic Control of Drug Reactions

General Outcome:

12.0 The student will describe the mechanism of action of drugs in relieving the adverse effects of pharmacologic management

SPECIFIC LEARNING OBJECTIVES:

To successfully complete this unit, the student will:

- 12.1 Identify the side effects of administered cardiopulmonary drugs
- 12.2 Identify the side effects which can be treated with pharmacologic agents
- 12.3 Define the mechanism of action, indications, dosages, route of administration and drug compatibilities of the following drugs:

Prochlorpromazine (Compazine)	Ranitidine (Zantac)
Trimethobenzamide (Tigan)	Benadryl