



# ILLINOIS VALLEY COMMUNITY COLLEGE

## COURSE OUTLINE

**DIVISION:** Health Professions

**COURSE:** DLH 1201: Pharmacology for the Dental Hygienist

Date: Spring 2024

Credit Hours: 2

*Complete all that apply or mark "None" where appropriate:*

Prerequisite(s): Acceptance into the Dental Hygiene A.A.S Degree Program

Enrollment by assessment or other measure?  Yes  No

If yes, please describe:

Corequisite(s): None

Pre- or Corequisite(s): None

Consent of Instructor:  Yes  No

Delivery Method:	<input checked="" type="checkbox"/> <b>Lecture</b>	<b>2 Contact Hours</b> (1 contact = 1 credit hour)
	<input type="checkbox"/> <b>Seminar</b>	<b>0 Contact Hours</b> (1 contact = 1 credit hour)
	<input type="checkbox"/> <b>Lab</b>	<b>0 Contact Hours</b> (2-3 contact = 1 credit hour)
	<input type="checkbox"/> <b>Clinical</b>	<b>0 Contact Hours</b> (3 contact = 1 credit hour)

Offered:  **Fall**  **Spring**  **Summer**

### **CATALOG DESCRIPTION and IAI NUMBER (if applicable):**

This course provides knowledge of therapeutic agents used in dentistry and the mechanisms of drug action in the body, enabling students to comprehend the manifestations of drug administration in dental hygiene. This course is designed to familiarize students with the medications that patients may be taking. Students learn specific drug actions, routes of administration, common dosages, precautions, contraindications, and side effects of pharmacological agents. Pharmacology of local anesthetics and vasoconstrictors is included.

## **ACCREDITATION STATEMENTS AND COURSE NOTES:**

This course fulfills the requirements set forth by the Commission on Dental Accreditation regarding content depth, breadth, and scope of the topic of Pharmacology for Dental Hygiene Students.

2-8b Biomedical science content must include content in anatomy, physiology, chemistry, biochemistry, microbiology, immunology, general and maxillofacial pathology and/or pathophysiology, nutrition, and pharmacology.

## **COURSE TOPICS AND CONTENT REQUIREMENTS:**

- I. General principles of pharmacology
  - a. History
  - b. Role of the dental hygienist
    - i. Medical history
    - ii. Medication administration
    - iii. Emergency situations
    - iv. Appointment scheduling
    - v. Nonprescription medication
    - vi. Nutritional or herbal supplements
  - c. Sources of information
  - d. Drug names
    - i. Drugs substitutions
  - e. Federal regulations and regulatory agencies
  - f. Clinical evaluation of a new drug
  - g. Drug legislation
  - h. Prescription writing
- II. Drug action and handling
  - a. Characterization of drug actions
    - i. Log dose-effect curve
    - ii. Potency
    - iii. Efficacy
    - iv. Therapeutic index
  - b. Mechanism of action of drugs
    - i. Receptors
  - c. Pharmacokinetics
    - i. Absorption
    - ii. Distribution
    - iii. Redistribution
    - iv. Metabolism
  - d. Clinical pharmacokinetics
    - i. Half-life
  - e. Factors that may alter the effect of a drug
    - i. Patient adherence
    - ii. Psychologic factors
    - iii. Tolerance
    - iv. Pathologic state
    - v. Time of administration
    - vi. Route of administration
    - vii. Sex
    - viii. Genetic variation
    - ix. Drug interactions

- x.Age and weight
    - xi.Environment
    - xii.Other
  - f. Routes of drug administration and dose forms
    - i.Routes of administration
    - ii.Dosage forms
- III. Adverse reactions of drugs
  - a. Definitions
  - b. Classifications
    - i.Toxic reaction
    - ii.Side effect
    - iii.Idiosyncratic reaction
    - iv.Drug allergy
    - v.Interference with natural defense mechanisms
  - c. Clinical manifestations of adverse reactions
  - d. Toxicologic evaluation of drugs
  - e. Recognizing adverse drug effects
- IV. Drugs used in Dentistry
  - a. Autonomic drugs
    - i.Autonomic nervous system
    - ii.Parasympathetic autonomic nervous system
    - iii.Sympathetic autonomic nervous system
  - b. Nonopioid (nonnarcotic) analgesics
    - i.Pain
    - ii.Classification
    - iii.Salicylates
    - iv.Nonsteroidal anti-inflammatory drugs
    - v.Acetaminophen
    - vi.Drugs used to treat gout
    - vii.Drugs used to treat arthritis
  - c. Opioid (narcotic) analgesics and antagonists
    - i.History
    - ii.Classification
    - iii.Mechanism of action
    - iv.Pharmacokinetics
    - v.Pharmacologic effects
    - vi.Adverse reactions
    - vii.Specific opioids
    - viii.Dental use of opioids
    - ix.Chronic dental pain and opioid use
  - d. Anti-infective agents
    - i.Dental infection “evolution”
    - ii.Definition
    - iii.Infection
    - iv.Resistance
    - v.Indications for antimicrobial agents
    - vi.General adverse reactions and disadvantages associated with anti-infective agents
    - vii.Penicillins
    - viii.Cephalosporins

- ix. Macrolides
- x. Tetracyclines
- xi. Clindamycin
- xii. Metronidazole
- xiii. Rational use of anti-infective agents in dentistry
- xiv. Antimicrobial agents for nondental use
- xv. Antituberculosis agents
- xvi. Topical antibiotics
- xvii. Antibiotic prophylaxis used in dentistry
- e. Antifungal and antiviral agents
  - i. Antifungal agents
  - ii. Antiviral agents
- f. Local anesthetics
  - i. History
  - ii. Ideal local anesthetic
  - iii. Chemistry
  - iv. Mechanism of action
  - v. Pharmacokinetics
  - vi. Pharmacologic effects
  - vii. Adverse reactions
  - viii. Composition of local anesthetic solutions
  - ix. Local anesthetic agents
    - x. Vasoconstrictors
    - xi. Choice of local anesthetic
    - xii. Topical anesthetics
    - xiii. Doses of local anesthetic and vasoconstrictor
- g. General anesthetics
  - i. History
  - ii. Mechanism of action
  - iii. Adverse reactions
  - iv. General anesthetics
  - v. Balanced general anesthesia
- h. Antianxiety agents
  - i. Definitions
  - ii. Benzodiazepines
  - iii. Mechanism of action
  - iv. Barbiturates
  - v. Nonbenzodiazepine-nonbarbiturate sedative-hypnotics
  - vi. Nonbenzodiazepine receptor hypnotics
  - vii. Melatonin receptor agonist
  - viii. Melatonin
  - ix. Orexin receptor antagonist
  - x. Centrally acting muscle relaxants
  - xi. Miscellaneous agents
  - xii. General comments about antianxiety agents
- V. Drugs that may alter dental treatment
  - a. Drugs for the treatment of cardiovascular diseases
    - i. Heart failure
    - ii. Angiotensin II receptor neprilysin inhibitor
    - iii. If Channel inhibitor

- iv. Cardiac glycosides
- v. Antiarrhythmic agents
- vi. Antianginal drugs
- vii. Antihypertensive agents
- viii. Antihyperlipidemic agents
- ix. Proprotein convertase subtilisin/Kexin type 9 inhibitors
- x. Drugs that affect blood coagulation
- xi. Thienopyridines
- xii. Drugs that increase blood clotting
- b. Drugs for the treatment of gastrointestinal disorders
  - i. Gastrointestinal drugs
  - ii. Celiac disease
- c. Drugs for the treatment of seizure disorders
  - i. Epilepsy
    - 1. Drug therapy
    - 2. Dental treatment
  - ii. Non seizure uses of antiepileptics
- d. Drugs for the treatment of central nervous system disorders
  - i. Psychiatric disorders
  - ii. Antipsychotic agents
  - iii. Antidepressant agents
  - iv. Drugs for treatment of bipolar disorder
- e. Adrenocorticosteroids
  - i. Mechanism of release
  - ii. Classification
  - iii. Definitions
  - iv. Routes of administration
  - v. Mechanism of action
  - vi. Pharmacologic effects
  - vii. Adverse reactions
  - viii. Uses
    - ix. Corticosteroid products
    - x. Dental implications
- f. Drugs for the treatment of respiratory disorders and allergic rhinitis
  - i. Respiratory diseases
  - ii. Dental implicating of respiratory drugs
  - iii. Allergic rhinitis
- g. Drugs for the treatment of diabetes mellitus
  - i. Pancreatic hormones
  - ii. Diabetes mellitus
  - iii. Treatment of hypoglycemia
- h. Drugs for the treatment of other endocrine disorders
  - i. Pituitary hormones
  - ii. Thyroid hormones
  - iii. Female sex hormones
  - iv. Male sex hormones
  - v. Other agents that affect sex hormone systems
- i. Antineoplastic drugs
  - i. Uses
  - ii. Mechanism of action

- iii. Classification
  - iv. Adverse drug effects
  - v. Combinations
  - vi. Dental implications
- VI. Explain special situations
- a. Emergency drugs
    - i. General measures
    - ii. Categories of emergencies
    - iii. Emergency kit for the dental office
  - b. Administration of drugs during pregnancy and breastfeeding
    - i. General principles
    - ii. Breastfeeding
    - iii. Dental drugs
  - c. Substance abuse disorders
    - i. Central nervous system depressants
    - ii. Sedative-hypnotics
    - iii. CNS stimulants
    - iv. Psychedelics
    - v. Identifying the substance user
    - vi. The impaired dental hygienist
  - d. Natural/herbal products and dietary supplements
    - i. Safety
    - ii. Drug interaction
    - iii. Standardization
    - iv. Good manufacturing practice
    - v. Herbal supplements used in oral care
  - e. Oral conditions and their treatment
    - i. Infectious lesions
    - ii. Immune reactions
    - iii. Miscellaneous oral conditions
    - iv. Inflammation
    - v. Drug-induced oral side effects
    - vi. Agents commonly used to treat oral lesions
  - f. Hygiene-related oral disorders
    - i. Dental caries
    - ii. Gingivitis
    - iii. Tooth hypersensitivity

#### **INSTRUCTIONAL METHODS:**

- Lecture
- Power Points
- Class discussion
- Demonstration
- Visual aids - videos, models, slides
- Exams and quizzes
- Problem solving exercises

## **EVALUATION OF STUDENT ACHIEVEMENT:**

A grade of "C" is required for graduation from the Dental Hygiene Program. The following grading scale will be used as a guide in determining the final grade in this course.

A= 92-100

B= 83-91

C= 75-82

D= 68-74

F= 67 and below

## **INSTRUCTIONAL MATERIALS:**

### **Textbooks**

Applied Pharmacology for the Dental Hygienist, 8<sup>th</sup> Edition, Haveles, 2020

### **Resources**

Evolve Elsevier Resources

Dentalcare.com

Drug Guides

Case Studies

## **LEARNING OUTCOMES AND GOALS:**

### **Institutional Learning Outcomes**

- 1) Communication – to communicate effectively.
- 2) Inquiry – to apply critical, logical, creative, aesthetic, or quantitative analytical reasoning to formulate a judgement or conclusion.
- 3) Social Consciousness – to understand what it means to be a socially conscious person, locally and globally.
- 4) Responsibility – to recognize how personal choices affect self and society.

## **Course Outcomes and Competencies**

### **1. Describe the Information, Sources, Regulatory Agencies, Drug Legislation, and Prescription Writing techniques used in dentistry.**

- 1.1. Discuss the history of pharmacology and its relationship to the dental assistant/hygienist.
- 1.2. List where detailed and updated information on medications can be found.
- 1.3. Define the ways in which drugs are named and the significance of each.
- 1.4. Define generic equivalence and how it is related to drug substitution.
- 1.5. Describe the acts and agencies within the federal government designed to regulate drugs.
- 1.6. Identify the four phases of clinical evaluation involved in drug approval and the five schedules of drugs.
- 1.7. Discuss the history of drug legislation, including the five schedules of controlled substances, the package inserts and black box warnings, differentiation between labeled and off-label uses, and orphan drugs and drug recalls.
- 1.8. Become familiar with the basics of prescription writing as well as describing the parts of the prescription and prescription label regulations.

### **2. Demonstrate a basic understanding of Drug Action and Handling.**

- 2.1. Differentiate dose, potency, and efficacy in the context of the actions of drugs.

- 2.2. Explain the pharmacologic effect of a drug.
- 2.3. Discuss the major steps of pharmacokinetics: absorption, distribution, metabolism, and excretion.
- 2.4. Explain how altering absorption, distribution, metabolism, and excretion can affect clinical pharmacokinetics.
- 2.5. Explain how half-life relates to clinical pharmacokinetics.
- 2.6. Provide an example of factors that may alter the effect of a drug.
- 2.7. Summarize the various routes of drug administration and the common dosage forms used.
3. **Demonstrate a basic understanding of Adverse Reactions caused by drugs used in the dental office.**
  - 3.1. Define an adverse drug reaction and name five categories of reaction.
  - 3.2. Discuss the risk-to-benefit ratio of the use of a drug for therapeutic effect and its potential adverse reactions.
  - 3.3. Explain how the toxic effects of drugs are evaluated.
  - 3.4. Discuss the importance of recognizing adverse drug effects.
4. **Demonstrate a comprehensive understanding of Autonomic Drugs used in Dentistry. (DA Standard: DH Standard: )**
  - 4.1. Identify the major components and functional organization of the autonomic nervous system.
  - 4.2. Discuss the major neurotransmitters in the sympathetic autonomic nervous system and the importance of receptors.
  - 4.3. Discuss the pharmacologic effects, adverse reactions, contraindications, and dental considerations of cholinergic agents, which act on the parasympathetic nervous system.
  - 4.4. Discuss the pharmacologic effects, adverse reactions, contraindications, and dental considerations of anticholinergic agents, which act on the parasympathetic nervous system.
  - 4.5. Discuss the pharmacologic effects, adverse reactions, contraindications, and dental considerations of adrenergic agents and list several specific adrenergic agents.
  - 4.6. Explain the workings of adrenergic blocking agents and neuromuscular blocking agents.
5. **Demonstrate a comprehensive understanding of Nonopioid (Nonnarcotic) Analgesics.**
  - 5.1. Describe pain and its purpose and main components
  - 5.2. Discuss the classification of analgesic agents and the chemistry, pharmacokinetics, pharmacologic effects, adverse reactions, toxicity, drug interactions, and uses of aspirin.
  - 5.3. Define the term nonsteroidal anti-inflammatory drug and discuss the chemistry, pharmacokinetics, pharmacologic effects, adverse reactions, toxicity, drug interactions, and uses of these drugs, giving several examples of these.
  - 5.4. Discuss the properties, pharmacologic effects, adverse reactions, drug interactions, uses, and dosing of acetaminophen.
  - 5.5. Explain the disease known as gout and summarize the drugs used to treat it.
  - 5.6. Explain the disease known as rheumatoid arthritis and summarize the mechanism of action of the classes of drugs used to treat it.



**6. Demonstrate a comprehensive understanding of Opioid (Narcotic) Analgesics and Antagonists.**

- 6.1. Explain the classification, mechanism of action, and pharmacokinetics of opioids.
- 6.2. List and describe the pharmacologic effects and potential adverse reactions of opioids.
- 6.3. Discuss the addiction potential of opioids, including treatment.
- 6.4. Name and explain the analgesic actions of the most common opioid agonists.
- 6.5. Discuss the actions of and provide examples of the mixed opioids.
- 6.6. Summarize the mechanism of action and adverse reactions of tramadol.
- 6.7. Apply the use of opioids to dentistry.

**7. Outline the history and basic principles of infection and its relevance to dentistry.**

- 7.1. Define the terms pertinent to a discussion about infection.
- 7.2. Identify the factors that determine the likelihood of an infection.
- 7.3. Describe the importance of cultures and sensitivity in relation to infections.
- 7.4. Discuss the reasons and understanding of “resistance” as important with regard to infections.
- 7.5. Summarize the principal indications for the use of antimicrobial agents.
- 7.6. Name and describe the major adverse reactions and disadvantages associated with the use of anti-infective agents.
- 7.7. Discuss Penicillins, cephalosporins, macrolides, tetracyclines—their chemical makeup, properties, mechanisms of action, uses, and potential adverse reactions, and name several specific types of each.
- 7.8. Name and describe two other types of antibiotics and anti-infective, including their chemical makeup, properties, mechanism of action, potential adverse reactions, and uses.
- 7.9. Discuss the rationale for the use of anti-infective agents in dentistry.
- 7.10. Discuss antimicrobial agents for nondental uses including their pharmacokinetics, mechanism of action, adverse reactions, and spectrum of use.
- 7.11. Describe the drugs used to treat tuberculosis and the difficulties this disease presents.
- 7.12. Discuss the use of topical antibiotics in dentistry.
- 7.13. Summarize the concept and practice of antibiotic prophylaxis in dentistry.

**8. Demonstrate a basic understanding of Antifungal and Antiviral Agents used in Dentistry.**

- 8.1. Name several types of antifungal agents and discuss their indications in dentistry and potential adverse reactions.
- 8.2. Discuss the use of antiviral agents in the treatment of herpes simplex.
- 8.3. Describe the various drugs and drug combinations used to treat acquired immunodeficiency syndrome.
- 8.4. Describe the various drugs used to treat chronic hepatitis.

**9. Discuss the history and reasons for the use of local anesthetics in dentistry**

- 9.1. List the properties an ideal local anesthetic would possess.
- 9.2. Describe the importance of understanding the chemistry involved in local anesthetic agents.
- 9.3. Explain the mechanism of action, pharmacokinetics, pharmacologic effects, and adverse reactions of local anesthetics.

- 9.4. Describe the composition of each of the drugs used in local anesthetic solutions and summarize the factors involved in the choice of a local anesthetic.
- 9.5. Briefly discuss the use, types, and doses of topical anesthetics used in dentistry.

**10. Demonstrate a comprehensive understanding of General Anesthesia used in Dentistry.**

- 10.1 Summarize the history of general anesthesia in dentistry.
- 10.2 Describe how general anesthesia works and the stages and planes involved, as well as possible adverse reactions associated with its use.
- 10.3 Compare and contrast the classifications of general anesthesia.
- 10.4 Discuss the use of nitrous oxide in dentistry, including how it works, the pharmacologic effects, adverse reactions, and contraindications.
- 10.5 Name and describe several types of halogenated hydrocarbons.
- 10.6 List the goals of surgical anesthesia and the importance of using balanced general anesthesia.

**11. Demonstrate a comprehensive understanding of Antianxiety Agents used in Dentistry.**

- 11.1 Discuss the value of patient relaxation in dentistry.
- 11.2 Describe the pharmacokinetics, mechanism of action, pharmacologic effects, adverse reactions, drug interactions, medical uses, and dental relevance of the benzodiazepines and barbiturates.
- 11.3 Name and briefly describe the mechanism of action of the nonbenzodiazepine-nonbarbiturate sedative-hypnotics and the nonbenzodiazepine-nonbarbiturate receptor agonists.
- 11.4 Name a melatonin receptor agonist and summarize its actions.
- 11.5 Explain the workings of the centrally acting muscle relaxants and how they are used.
- 11.6 Name and briefly describe a few of the miscellaneous muscle relaxant agents that can be used.
- 11.7 Discuss some general precautions about which the dental practitioner should be aware with the use of antianxiety agents.

**12. Discuss drugs that may alter dental treatment**

- 12.1 Discuss drugs for the treatment of cardiovascular diseases
- 12.2 Discuss drugs for the treatment of gastrointestinal disorders
- 12.3 Discuss drugs for the treatment of seizure disorders
- 12.4 Discuss drugs for the treatment of central nervous system disorders
- 12.5 Discuss adrenocorticosteroids
- 12.6 Discuss drugs for the treatment of respiratory disorders and allergic rhinitis
- 12.7 Discuss drugs for the treatment of diabetes mellitus
- 12.8 Discuss drugs for the treatment of other endocrine disorders
- 12.9 Discuss antineoplastic drugs

**13. Discuss special situations in which the dental hygienist must apply pharmacological knowledge.**

- 13.1 Discuss emergency drugs
- 13.2 Discuss administration of drugs during pregnancy and breastfeeding
- 13.3 Discuss substance abuse disorders
- 13.4 Discuss natural/herbal products and dietary supplements
- 13.5 Discuss oral conditions and their treatment
- 13.6 Discuss hygiene-related oral disorders