

**Course Code:** DHG 214

**Course Title:** Nitrous Oxide/Oxygen Sedation

**Department:** Allied Health

**Effective Date:** Summer 2026

**PCS Code:** 1.2 - Occupational/Technical Instruction

**CIP Code:** 51.0601

**Repeatability:** 0

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### Credit Hours

**Catalog Notation:** 1-0-1

**Credit Hour Distribution:**

Lecture: 1

Lab: 0

Clinical: 0

**Total: 1**

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### General Course Information

#### Catalog Description

A comprehensive introduction to conscious sedation (i.e., the administration and monitoring of nitrous oxide and oxygen sedation). Anatomy, physiology, pharmacology, and the ethical and legal aspects of nitrous oxide and oxygen sedation use.

#### General Course Objectives

- Demonstrate knowledge of the history of conscious sedation.
- Demonstrate knowledge of the appropriate patient selection.
- Demonstrate basic knowledge of the chemical composition of nitrous oxide and its effect in the human body.
- Demonstrate knowledge of the regulation and storage of nitrous oxide.
- Demonstrate knowledge of the various delivery systems and their efficacy.
- Demonstrate the ability to administer conscious sedation on a patient.
- Recognize the signs and symptoms of conscious sedation.
- Demonstrate knowledge of the steps necessary to help a patient recover from sedation.
- Demonstrate knowledge of the possible issues with nitrous oxide.
- Demonstrate knowledge of the health risks to the patient and personnel of conscious sedation.
- Demonstrate knowledge of the appropriate record-keeping procedures.
- Demonstrate knowledge of the ethical and legal ramifications of the use of or misuse of nitrous oxide.

Learning outcomes: After completing this course, the student will have met the following competencies:

- Establish and prioritize a planned sequence of care based on the dental hygiene diagnosis, including nitrous oxide sedation for the reduction of anxiety during various dental procedures.
- Demonstrate the ability to correctly administer nitrous oxide.

- Apply knowledge of infection control in the maintenance of client care facilities, following the regulatory standards and requirements established by OSHA and other federal, state, and local agencies.
- Demonstrate the ability to effectively communicate a wide range of information with patients regarding preventive, therapeutic, and educational information.

### Minimum Placement Levels

| English                  | Reading                  | Math |
|--------------------------|--------------------------|------|
| Placement out of ENG 099 | Placement out of CCS 098 | None |

### Prerequisites

Credit in DHG 110, DHG 118, and DHG 119

Current BLS/CPR card

Admission into the Dental Hygiene program

### Methods of Evaluation

15-18 online chapter review quizzes, 1 reflective post and minimum 2 short answer responses, a 50 point multiple choice final, and 4 hours of peer practicum/clinical instruction on campus.

### Instructional Materials and Additional Supplies

Handbook of Nitrous Oxide and Oxygen Sedation, Morris Clark and Ann Brunick, current edition. 978-0-323-56742-8

Darby's Comprehensive Review of Dental Hygiene, Blue, C.M., current edition, Elsevier, St. Louis. 978-0-323-31671-2

Use of computer to complete online course assignments.

## Course Content

### General Learning Outcomes (GLOs)

- Communication: Students will demonstrate the ability to read, write, listen, and speak effectively.

### Course Segments and Student Learning Outcomes

| Course Segment                                                                        | Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Lecture Hours | Lab Hours | Clinical Hours |
|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------|----------------|
| Discovery, History, and Evolution of Nitrous Oxide and Oxygen Sedation                | <ol style="list-style-type: none"> <li>1. Understand the significance of the discovery of nitrous oxide and oxygen.</li> <li>2. Discuss the paucity of pain control in the early nineteenth century.</li> <li>3. Appreciate the foresight and ingenuity of Horace Wells as the individual responsible for recognizing the anesthetic values of N<sub>2</sub>O.</li> <li>4. Appreciate the evolutionary path of N<sub>2</sub>O to its current place in the spectrum of analgesia and sedation options.</li> </ol> | 1             | 0         | 0              |
| Physical Properties and Pharmacokinetics/Pharmacodynamics of Nitrous Oxide and Oxygen | <ol style="list-style-type: none"> <li>1. Discuss physical and chemical properties of nitrous oxide.</li> <li>2. Discuss physical and chemical properties of oxygen.</li> <li>3. Discuss the pharmacokinetic properties of nitrous oxide.</li> <li>4. Discuss the pharmacodynamic properties of nitrous oxide.</li> </ol>                                                                                                                                                                                        | 1             | 0         | 0              |

| Course Segment                                                                                                   | Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Lecture Hours | Lab Hours | Clinical Hours |
|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------|----------------|
| Manufacturing, Use, and Distribution of Nitrous Oxide and Oxygen Gases                                           | <ol style="list-style-type: none"> <li>1. Understand the simplicity of the nitrous oxide manufacturing process.</li> <li>2. Discuss the primary users of nitrous oxide.</li> <li>3. Identify the regulatory agencies responsible for the oversight of nitrous oxide.</li> <li>4. Identify how nitrous oxide is stored.</li> <li>5. Identify properties of nitrous oxide and oxygen cylinders.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1             | 0         | 0              |
| Ethical and Legal Considerations Regarding Nitrous Oxide and Oxygen Administration; Guidelines for Best Practice | <ol style="list-style-type: none"> <li>1. Understand there are legal requirements for administering nitrous oxide and oxygen sedation.</li> <li>2. Discuss appropriate educational levels and training requirements for nitrous oxide and oxygen administration.</li> <li>3. Understand the importance of obtaining written informed consent before nitrous oxide and oxygen sedation.</li> <li>4. State the components of appropriate informed consent for nitrous oxide and oxygen sedation.</li> <li>5. Identify the ethical principles associated with nitrous oxide and oxygen sedation.</li> <li>6. Identify ethical responsibilities associated with the administration of nitrous oxide and oxygen sedation.</li> <li>7. Identify appropriate practice guidelines for the administration of nitrous oxide and oxygen sedation based on ethical and legal principles.</li> <li>8. Discuss the historical safety record of nitrous oxide and oxygen sedation.</li> <li>9. Discuss current practice guidelines established for non-anesthesiologists working in an ambulatory setting.</li> <li>10. Understand the initial characteristics of nitrous oxide and oxygen sedation.</li> </ol> | 1             | 0         | 0              |
| Pain and Anxiety Management                                                                                      | <ol style="list-style-type: none"> <li>1. Identify the physiologic mechanism of pain.</li> <li>2. Appreciate the many variations of pain reactions among individuals.</li> <li>3. Discuss methods for assessing and measuring pain.</li> <li>4. Appreciate the relationship between pain and anxiety.</li> <li>5. Discuss methods for assessing and measuring fear and anxiety.</li> <li>6. Discuss the spectrum of pain and anxiety management options.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1             | 0         | 0              |
| Anatomy and Physiology of Respiration and Airway Management; Nitrous Oxide and Its Interaction with the Body     | <ol style="list-style-type: none"> <li>1. Review the anatomy of the upper and lower airways.</li> <li>2. Discuss the potential for airway obstruction.</li> <li>3. Review acceptable airway management techniques.</li> <li>4. Review the physiology of respiration.</li> <li>5. Appreciate the critical gas exchange across pressure gradients with nitrous oxide.</li> <li>6. Identify the role of additional monitoring devices, such as pulse oximetry and capnography, in nitrous oxide and oxygen sedation.</li> <li>7. Describe how to manage patients in the category of moderate sedation (&gt;50% nitrous oxide).</li> <li>8. Identify the interaction of nitrous oxide with body systems.</li> <li>9. Identify how nitrous oxide interacts with patients who have other health issues that could impact the sedation experience.</li> </ol>                                                                                                                                                                                                                                                                                                                                           | 1             | 0         | 0              |

| Course Segment                                                                                                      | Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Lecture Hours | Lab Hours | Clinical Hours |
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| Patient Assessment and Evaluation                                                                                   | <ol style="list-style-type: none"> <li>1. Appreciate the value of patient health history information.</li> <li>2. Understand the necessity of assessing patient risk before nitrous oxide and oxygen sedation.</li> <li>3. Make sense of the American Society of Anesthesiologists Physical Status Classification System as a method of categorizing patients' health.</li> <li>4. Identify the components included in a preprocedural patient evaluation for nitrous oxide and oxygen sedation.</li> <li>5. Discuss measures for patient preparation before nitrous oxide and oxygen sedation.</li> <li>6. Understand the necessity for patient monitoring during nitrous oxide and oxygen sedation.</li> <li>7. Discuss the monitoring procedures associated with nitrous oxide and oxygen sedation.</li> <li>8. Discuss the importance of emergency preparedness in terms of personnel preparation and necessary equipment.</li> </ol>                                                                                                                                                              | 1             | 0         | 1              |
| Delivery of Nitrous Oxide/Oxide Sedation                                                                            | <ol style="list-style-type: none"> <li>1. Appreciate the history and evolution of nitrous oxide and oxygen sedation delivery equipment.</li> <li>2. Discuss the differences between a central gas and portable gas supply system.</li> <li>3. Identify each component and its purpose in the nitrous oxide and oxygen sedation delivery system.</li> <li>4. Discuss variations of nitrous oxide and oxygen sedation delivery systems.</li> <li>5. Identify the safety features found on the nitrous oxide and oxygen sedation delivery system.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2             | 0         | 3              |
| Desirable Characteristics of Nitrous Oxide/Oxygen Sedation; Signs and Symptoms of Nitrous Oxide and Oxygen Sedation | <ol style="list-style-type: none"> <li>1. Identify the analgesic properties of nitrous oxide and oxygen sedation.</li> <li>2. Identify the anxiolytic properties of nitrous oxide and oxygen sedation.</li> <li>3. Identify the amnestic effect when using nitrous oxide and oxygen sedation.</li> <li>4. Describe the onset of action.</li> <li>5. Discuss the advantage of nitrous oxide and oxygen sedation with regard to the ability to titrate the drug.</li> <li>6. Identify the recovery process following nitrous oxide and oxygen sedation.</li> <li>7. Discuss the process of nitrous oxide elimination from the body.</li> <li>8. Appreciate the well-documented acceptance of nitrous oxide and oxygen sedation.</li> <li>9. Discuss other methods of patient management that are combined with nitrous oxide and oxygen and discuss the advantages and disadvantages of each.</li> <li>10. Discuss the signs and symptoms of appropriate minimal sedation using nitrous oxide and oxygen.</li> <li>11. Discuss the signs and symptoms associated with too much nitrous oxide.</li> </ol> | 2             | 0         | 0              |

| Course Segment                                                                                                                | Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Lecture Hours | Lab Hours | Clinical Hours |
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| Technique for Nitrous Oxide and Oxygen Administration and Assessment of Recovery; Titration of Nitrous Oxide and Oxygen Gases | <ol style="list-style-type: none"> <li>1. Understand the fundamental principles for appropriate nitrous oxide and oxygen sedation.</li> <li>2. Discuss general unit preparation activities before nitrous oxide and oxygen administration.</li> <li>3. Understand how to activate nitrous oxide and oxygen sedation equipment.</li> <li>4. Describe measures taken to prepare the patient before nitrous oxide and oxygen sedation.</li> <li>5. Describe the technique steps for the appropriate administration of nitrous oxide and oxygen sedation.</li> <li>6. Understand the principles of recovery.</li> <li>7. Describe the psychologic and psychomotor effects of nitrous oxide and oxygen sedation recovery.</li> <li>8. Discuss the appropriate technique for assessing adequate recovery from nitrous oxide and oxygen sedation.</li> <li>9. Discuss the signs and symptoms of adequate nitrous oxide and oxygen sedation recovery.</li> <li>10. Discuss appropriate sterilization and disinfection procedures for nitrous oxide and oxygen sedation equipment.</li> <li>11. Discuss important documentation procedures associated with nitrous oxide and oxygen sedation.</li> <li>12. Define titration as a method of drug administration.</li> <li>13. Understand the significance of titration.</li> <li>14. Understand the concept of individual biovariability and how it affects nitrous oxide and oxygen recovery time.</li> <li>15. Discuss the advantages of the ability to adjust sedation levels using nitrous oxide and oxygen sedation.</li> </ol> | 2             | 0         | 0              |
| Nitrous Oxide and Oxygen Sedation in Pediatrics                                                                               | <ol style="list-style-type: none"> <li>1. Identify stages of child development according to Piaget.</li> <li>2. Appreciate the guidance from the American Academy of Pediatrics and the American Academy of Pediatric Dentistry regarding nitrous oxide and oxygen administration.</li> <li>3. Discuss patient considerations related to working with children.</li> <li>4. Understand the difference between rapid induction versus the titration method for administration of nitrous oxide and oxygen sedation in children.</li> <li>5. Understand safety considerations associated with pediatric patients and nitrous oxide and oxygen sedation.</li> <li>6. Understand the steps for administration of nitrous oxide and oxygen sedation in pediatric dentistry.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1             | 0         | 0              |

| Course Segment                                                                                                          | Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Lecture Hours | Lab Hours | Clinical Hours |
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| Potential Biohazards for Health Personnel Associated with Chronic Exposure to Nitrous Oxide; Nitrous Oxide Abuse Issues | <ol style="list-style-type: none"> <li>1. Discuss specific biologic issues and health concerns associated with chronic exposure to nitrous oxide.</li> <li>2. Understand the history of nitrous oxide literature and how it relates to the changes in its use and practice.</li> <li>3. Identify methods for the detection and monitoring of trace nitrous oxide gas in ambient air.</li> <li>4. Understand what is meant by a nitrous oxide scavenging system.</li> <li>5. Discuss best practice control measures to minimize trace oxygen.</li> <li>6. Discuss common substances that are abused by inhalation.</li> <li>7. Discuss the dangers of inhalant abuse.</li> <li>8. Understand how nitrous oxide is abused.</li> <li>9. Discuss the health hazards associated with chronic exposure to nitrous oxide.</li> <li>10. Understand how euphoric effects associated with nitrous oxide abuse can be related to sexual phenomena.</li> </ol> | 1             | 0         | 0              |

**Total Contact Hours**

| Lecture Hours | Lab Hours | Clinical Hours |
|---------------|-----------|----------------|
| 15            | 0         | 4              |