DNH 214
Practical Materials for Dental Hygiene

Course Description:
Studies the current technologic advances, expanded functions, and clinical/laboratory materials used in dental hygiene practice. Provides laboratory experience for developing skills in the utilization and applications of these technologies and functions.

Semester Credits: 2  Lecture Hours: 1  Lab Hours: 1
Course Outcomes

At the completion of this course, the student should be able to:

Gain knowledge to apply the current technologic advances, expanded functions, and clinical application for the materials used in dentistry and dental hygiene practice.
DNH 214 Practical Materials for Dental Hygiene

Textbook:

Dental Materials. Clinical Applications for Dental Assistants and Dental Hygienists by Hatrick, Eakle, and Bird. 3rd edition
ISBN: 9781455773855

Clinical Practice of the Dental Hygienist by Esther M. Wilkins 11th edition
ISBN: 9781608317189

Virginia Western Community College Dental Hygiene Student Guidelines & Procedure Manual 2015-2016

The following supplementary materials are provided to each student:

1. Practical Materials for Dental Hygiene Laboratory Book – Lab Activities & Skill Assessments
DNH 214 Practical Materials for Dental Hygiene

Course Objectives:

Chapter 1 – Introduction to Dental Materials

1. Explain the importance of the study of dental materials for the allied oral health practitioner.
2. Explain why it is necessary that the allied oral health practitioner have an understanding of dental materials for the delivery of dental care.
3. Review the historical development of dental materials.
4. List the agencies responsible for setting standards and specifications of dental materials.
5. List the requirements necessary for a consumer product to qualify for the ADA Seal of Acceptance.

Chapter 2 – Oral Environment and Patient Considerations

1. List the qualities of the oral environment that make it challenging for long-term clinical performance of dental materials.
2. Describe the long-term clinical requirements of therapeutic and restorative materials.
3. List the three types of biting forces and the tooth structures most ideally suited to them.
4. Define stress, strain, and ultimate strength, and compare the ultimate strength of restorative materials during each type of stress to tooth structures.
5. Describe the effects of moisture and acidity on dental materials.
6. Describe the clinical significance of galvanism and how it can be prevented.
7. Describe the process used to achieve mechanical, chemical, and bonding retention.
8. Describe the factors that determine successful adhesion, including wettability, viscosity, film thickness, and surface characteristics.
9. Describe microleakage and how the results of this process can lead to recurrent decay and postoperative sensitivity.
10. Describe tooth color in terms of hue, value, and chroma.
Chapter 3 - Physical Properties of Dental Materials

1. Define primary and secondary bonds and give an example of how each determines the properties of the material.
2. List the three forms of matter and give a defining characteristic of each.
3. Define hardness and describe how hardness contributes to abrasion resistance.
4. Define elasticity and give and example of when elasticity is desirable in dental procedures.
5. Define ductility and malleability and explain how these characteristics contribute to the edge strength of a gold crown.
6. Define viscosity and thixotropic materials and describe the clinical significance of each.
7. Differentiate between therapeutic, preventive, and restorative materials.
8. Describe the reaction stages a material undergoes to acquire its final state.

Chapter 4 – General Handling and Safety

1. Identify five job related health and safety hazards for employees in dental offices, and explain the methods of prevention of each one.
2. Explain the components of the Occupational Safety and Health Administration Hazard Communication Standard.
3. Describe the ways that chemicals can enter the body.
4. Describe the employee and employer responsibility for safety training.

Chapter 7 – Preventive and Bleaching Materials

1. Pit and Fissure Sealants
2. Discuss the use of sealants for prevention of pit and fissure caries.
3. Describe the composition of sealants.
4. Recite the steps for applying sealants.
5. Apply pit and fissure sealants correctly.
6. Describe the uses of mouth guards
7. List the materials for the fabrication of mouth guards.
8. Fabricate a sport mouth guard.
9. Describe the methods used to bleach teeth.
10. Describe the similarities and differences among the materials used to bleach teeth.
11. Explain the differences between professionally supervised home bleaching and over-the-counter systems.

Chapter 5 - Principles of Bonding

1. Discuss the effects of acid etching on enamel and dentin.
2. Describe the basic steps of bonding.
3. Describe the agents used for bonding.
4. Explain how the hybrid layer is formed.
5. Discuss the factors that interfere with good bonding.
6. Describe the amalgam bonding technique.
7. Describe the bonding of orthodontic brackets.
8. Describe the bonding of endodontic posts.
9. Explain the differences in bonding to enamel, dentin, metal, and porcelain.
10. List the factors that contribute to tooth sensitivity after bonding.

Chapter 6 – Composites, Glass Ionomers, and Compomers

1. Describe the various types of composite resin restorative materials.
2. Discuss the uses, advantages, and disadvantages of each type of composite resin.
3. Compare and contrast the similarities and differences among chemical-cured, light cured, and dual-cured composite resins.
4. Describe how fillers affect the properties of composites.
5. Explain why incremental placement of composite resin is recommended.
6. Discuss the procedural differences between direct and indirect composite restorations.
7. Describe the composition of glass ionomer restoratives and their uses, advantages, and disadvantages.
8. List the components of compomers.
9. Describe the use of compomers.

Chapter 15 – Gypsum Products

1. Differentiate between negative and positive reproduction.
2. Differentiate among diagnostic cast, working cast, and dies.
3. Describe the physical and chemical nature of gypsum products.
4. Explain the manufacturing process for gypsum products and how this affects their physical characteristics.
5. Explain the initial and final set of gypsum and the factors that affect the setting time, setting expansion, and strength.
6. Explain the procedure for mixing and handling gypsum products to create diagnostic casts.
7. Prepare model plaster and stone for pouring.
8. Pour the anatomic and base portions of maxillary and mandibular diagnostic casts.

Chapter 14 – Impression Materials

1. Impression Trays
   a. Describe the purpose of an impression.
   b. List the various categories of impression materials and explain their differences.
   c. Describe important characteristics of impression materials.

2. Elastic Impression Materials
   a. Hydrocolloids
      i. Describe the factors that make agar hydrocolloid a reversible material.
      ii. Define sol and gel and describe these states as they occur with the hydrocolloids.
      iii. List the components of alginate impression material and discuss their functions.
      iv. Explain why alginate is an irreversible hydrocolloid.
      v. List the supplies needed to make an alginate impression and explain how they are used.
      vi. Demonstrate tray selection for alginate impressions.
      vii. Demonstrate mixing alginate, loading and seating the tray, and removing the impression.
Chapter 16 – Polymers for Prosthetic Dentistry

1. Describe the stages of addition polymerization.
2. List the important properties of acrylic resins.
3. Describe the procedure for heat processing a denture.
4. Explain the differences between hard and soft lining materials.
5. Describe the advantages and disadvantages of chairside and laboratory hard liners.
6. List the indications for the use of acrylic teeth versus porcelain teeth.
7. Describe the process for repairing acrylic dentures.
8. Understand the steps for fabrication of custom acrylic impression trays.
9. Understand the steps for fabrication of record bases for complete denture procedures using light-cured material.

Chapter 17 – Provisional Restorations

1. State the purpose of provisional coverage.
2. List examples of circumstances that may require provisional coverage.
3. Distinguish between intracoronal and extracoronal restorations.
4. Differentiate between direct and indirect fabrication techniques.
5. Describe the technique for fabrication of metal, polycarbonate, custom, and cement provisional restorations.

Chapter 18 – Dental Waxes

1. Identify common components of dental waxes.
2. Identify properties of waxes.
3. Identify the three classifications of waxes.
4. Differentiate between direct and indirect waxings and identify which property of dental waxes is most important in their difference.
5. Describe the usual color, form, and use of inlay, casting, baseplate, boxing, utility, and sticky waxes.
6. Obtain a bite registration using bite registration or utility wax.

Chapter 8 – Dental Ceramics

1. Describe the mechanism for bonding porcelain to metal for porcelain-fused-to-metal (PFM) crowns.
2. List the types of alloys used in the PFM crowns.
3. Describe where most failures occur in PFM crowns.
4. List the methods of fabrication for all-ceramic restorations.
5. Explain how CAD/CAM technology is used to “make impressions” and fabricate a ceramic crown.
6. List the indications for porcelain veneers.
7. Define chroma, value, and hue.
8. Describe steps to be taken to ensure proper conditions for shade taking.

Chapter 10 – Casting Metals, Solders, and Wrought Metal Alloys

1. Describe the differences among the types of gold alloy used for dental restorations.
2. Define karat and fineness.
3. Differentiate among high-noble, noble, and base-metal alloys.
4. Explain the biocompatibility problems associated with some alloys.
5. Explain how solders are used.
6. Describe how wrought metal alloys differ from casting alloys.
7. Describe the uses of wrought wire.
8. Describe the metals used for orthodontic brackets and how they bond to teeth.
9. Explain the purpose of a post.
10. List the various classifications of posts.

Chapter 11 – Dental Implants

1. Describe the basic types of implants used in dentistry today.
2. Describe the metals used for dental implants.
3. Explain osseointegration of an implant.
4. Discuss the clinical care of dental implant fixtures.
5. Explain the rationale for use of plastic instruments for cleaning implants and discuss when metal instruments can be used.
6. List home care aids for implants and explain how they are used.
Chapter 13 – Dental Cement

1. Discuss the uses of cements in dentistry for:
   a. Pulpal protection
   b. Luting
   c. Restorations
   d. Surgical dressing
2. Discuss the advantages and disadvantages of each cement noted above.
3. Discuss the manipulation considerations for mixing cements.
4. Describe the procedure for filling a crown with luting cement.
5. Describe the procedure for removing excess cement after cementation.
6. Apply the correct mixing technique for each type of cement noted above.

Chapter 9 – Dental Amalgam

1. Discuss the safety of amalgam as a restorative material.
2. List the main components of amalgam.
3. Describe the advantages of high-copper amalgams over low-copper amalgams.
4. Describe the role of the gamma 2 phase in corrosion of amalgam.
5. Describe the particle shapes in lathe cut, admix, and spherical alloys, and discuss their effects on the condensation resistance of the freshly mixed amalgam.
6. Define creep, corrosion, and tarnish.
7. Discuss the effect of mixing time on the strength and manipulation of amalgam.
8. Describe the advantages and disadvantages of bonded amalgam restorations.
9. Discuss mercury hygiene in the dental office.

Chapter 12 – Abrasion, Finishing, and Polishing

1. Define abrasion, finishing, polishing, and cleansing.
2. Identify the factors that affect the rate and efficiency of abrasion.
3. Compare the relative ranking of abrasives on restorations and tooth structures.
4. Identify methods by which dental abrasives are applied.
5. Describe the safety and infection control precautions taken by the operator when using abrasives.
6. Finish and polish a preexisting amalgam restoration.

**DNH 214 Practical Materials for Dental Hygiene**

**Topical Description:**

UNIT 1: INTRODUCTION TO DENTAL MATERIALS – WEEKS 1-3

A. Introduction to Dental Materials
B. Role of the Allied Oral Health Practitioner and Dental Materials
C. Historical Development of Dental Materials
D. Agencies Responsible for Standards
E. Oral Environment and Patient Considerations
F. Physical Properties of Dental Materials
G. General Handling and Safety
H. Material Hazards in the Dental Office and Lab
I. Chemical Safety in the Dental Office and Lab
J. Chemical Toxicity
K. Personal Chemical Protection
L. Control of Chemical Spills
M. Storing and Disposal of Chemicals
N. Occupational Safety and Health Administration
O. Hazard Communication Standard
P. Bio-aerosols in the Dental Setting
Q. Patient Safety
R. Preventive Materials
S. Pit and Fissure Sealants

UNIT 2: IMPRESSION MATERIALS, GYPSUM, GUARDS AND TEETH BLEACHING – WEEKS 5-7

A. Impression Materials
B. Impression Trays
C. Elastic Impression Materials
D. Disinfecting Impressions and Casts
E. Gypsum Products
F. Properties and Behaviors of Gypsum Products
G. Classification of Gypsum Products
H. Manipulation
UNIT 3: CERAMICS, METALS, IMPLANTS AND WAXES – WEEKS 9-10

A. Dental Ceramics (Porcelain)
B. Feldspathic Porcelain
C. Porcelain-Metal Restorations
D. Veneers
E. Shade Taking
F. Hue, chroma, and value
G. Lighting for shade taking
H. Matching the shade
I. Casting Alloys
J. Solders
K. Wrought Metal Alloys
L. Metals Used in Orthodontics
M. Endodontic Posts
N. Implant Materials
O. Subperiosteal, Transosteal, and Endosseous
P. Maintenance, Home Care, Hygiene Visits/Polishing
Q. Implant Failure
R. Dental Waxes
S. Composition and Properties
T. Melting Range, Flow, Excess Residue and Dimensional Change
U. Classification of Waxes
V. Pattern Waxes, Processing Waxes, and Impression Waxes
W. Manipulation
X. Lost Wax Technique

UNIT 4: PROVISIONALS – WEEK 12

A. Purpose of provisional
B. Types of materials utilized in provisionals
C. Contributing factors on selecting provisional
D. Technique in placement
E. Adequate cement selected
F. Maintenance and Home Care post placement

UNIT 5: AMALGAM, ABRASION, FINISHING AND POLISHING – WEEKS 14-15

A. Alloy Versus Amalgam
B. Silver Based Amalgam Alloy Particles
C. Composition
D. Setting Transformation
E. Setting Reactions
F. Tarnish
G. Corrosion
H. Creep
I. Dimensional Change
J. Strength
K. Handling Characteristics
L. Bonding Amalgam
M. Mercury Safety Procedures
N. Mercury Free Amalgam
O. Finishing and Polishing
P. Factors Affecting Abrasion
Q. Delivery Design of Abrasives
R. Materials used in abrasion
S. Finishing and Polishing Procedures
T. Margination and removal of flash
U. Polishing Amalgam, Composite, Gold Alloy, Porcelain, Resin/Cement Interface
V. Safety/Infection Control with Finishing and Polishing