

# D H 310: DENTAL MATERIALS

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2021
Units:	3
Hours:	2 lecture, 3 laboratory per week (60 total per quarter)
Advisory:	Not open to students with credit in D H 72.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

## Student Learning Outcomes

- Students will be able to assess and categorize a patient's caries risk and propose a plan to either arrest the patient's caries process or reduce further risk of decay.
- Students will be able to evaluate a patient's dental and restorative conditions and chart significant findings.

## Description

Properties of dental materials, characteristics and manipulation of dental materials and the equipment used in the manipulation of these materials with an emphasis on dental hygiene care. Course also covers caries risk assessment, hazardous waste management, MSDS and regulations related to dental materials. Intended for students in the Dental Hygiene Baccalaureate Degree Program; enrollment is limited to students accepted in the program.

## Course Objectives

The student will be able to:

- Evaluate restorations on a patient and perform restorative charting.
- Effectively remove soft/hard deposits and polish removable prosthetic appliances and explain home care procedures to patients.
- Verbally communicate pre-operative and post-operative instructions to the patient.
- Explain common restorative materials and procedures in response to patient inquiries.
- Explain fabrication of restorations by the dental laboratory technician or by CAD CAM.
- Asses caries risk assessment and state the rationale for placing patients in low, medium, or high risk categories.
- Categorize the agencies that monitor dental material usage and regulations and cite their scope of authority.
- Explain physical and mechanical properties of dental materials.
- Fabricate, pour and trim study models.
- Fabricate and deliver bleaching splinters.
- Place and evaluate pit and fissure sealants.
- Test for tooth vitality and analyze the results.
- Explain the function of bases, liners and cements utilized during restorative procedures.
- Describe OSHA guidelines concerning hazardous waste management.

- Explain appropriate disposal of mercury and mercury containing products and the potential environmental risks of improper disposal.
- Perform appropriate infection control procedures for laboratory procedures to avoid cross contamination.
- Appropriately document procedures performed on patient/partners.
- Explain the ethical principles involved with the use of dental materials in the oral cavity of the patient.

## Course Content

- Restorative charting (Lec and Lab)
  - Armamentarium
  - Paper chart versus electronic chart
  - Assessment procedures
    - Missing teeth
    - Existing restorations
    - Existing conditions
      - Restorative classifications
      - Caries detection
        - Methods
          - Visual
          - Tactile
          - Radiographic
          - Caries indicator dye
          - Electronic caries detection devices
            - Diagnodent
            - Midwest Caries ID
        - Cavity classifications
- Removable prosthetic appliances (Lec and Lab)
  - Types
    - Removable partial denture
    - Full denture
    - Flipper
  - Components
  - Care and patient instructions
  - Removal of deposits at recall appointments
    - Ultrasonic cleaning
      - Armamentarium
      - Procedure
    - Polishing agents and professional polishing
      - Armamentarium
      - Procedure
        - Dental lathe
        - Polishing agents
        - Safety
- Pre-operative and post-operative instructions (Lec and Lab)
  - Dental sealants
  - Bleaching
  - Restorative materials and procedures (Lec)
    - Types of restorations
      - Direct restorations
      - Indirect restorations
    - Advantages and disadvantages
    - Limitations
    - Cost and life expectancies
  - Fabrication of restorations (Lec)
    - Procedure for appointment
    - In-office fabrication
      - CAD CAM technology
      - Dental laboratory fabrication
        - Porcelain bonded to metal
        - Full gold restorations

- c. Veneers
- d. Inlays
- e. Onlays
- F. Caries risk assessment (Lec and Lab)
  - 1. Theory of caries risk
    - a. Risk factors
    - b. Protective factors
  - 2. Caries risk assessment tests
    - a. Measure saliva flow
      - 1) Armamentarium
      - 2) Procedure
      - 3) Conclusion from results
    - b. Bacterial testing
      - 1) Armamentarium
      - 2) Procedure
      - 3) Conclusion from results
    - c. Bacterial meter
      - 1) Armamentarium
      - 2) Procedure
      - 3) Conclusion from results
  - 3. Completing caries risk assessment form
  - 4. Recommendations for prevention of caries based on caries risk assessment and saliva
    - a. Low risk
    - b. Moderate risk
    - c. High risk
    - d. Extreme risk
- G. Agencies that monitor dental material usage (Lec)
  - 1. Regulatory agencies
    - a. EPA
    - b. FDA
  - 2. Agencies that make recommendations
    - a. Organization for Safety, Asepsis, and Prevention (OSAP)
    - b. American Dental Association (ADA)
    - c. Centers for Disease Control (ADA)
    - d. National Institutes of Health (NIH)
  - 2. Historical background
  - 3. Need for regulatory agencies
- H. Properties of dental materials (Lec)
  - 1. Physical properties
    - a. Density
    - b. Boiling and melting points
    - c. Vapor pressure
    - d. Thermal conductivity
    - e. Coefficient of thermal expansion
    - f. Electrical conductivity
      - 1) Metals versus polymers and ceramics
      - 2) Electrosurgery and electronic pulp testing
    - g. Viscosity
    - h. Wetting
    - i. Hardness
      - 1) Hardness testing
        - a) Brinell
        - b) Rockwell
        - c) Vickers
        - d) Knoop
        - e) Durometer testing for soft materials
      - j. Abrasion resistance
      - k. Solubility
        - l. Water sorption
          - 1) Imbibition
          - 2) Syneresis
  - m. Color
  - n. Radiographic appearance
- 2. Mechanical properties
  - a. Load
  - b. Stress
  - c. Strain
  - d. Elastic limit, proportional limit, yield point
  - e. Ultimate strength
  - f. Stress/strain curve
  - g. Types of stress
    - 1) Compression
    - 2) Tension
    - 3) Torsion
    - 4) Shear
    - 5) Bending
  - h. Resilience and toughness
  - i. Fatigue
  - j. Time-dependent properties
    - 1) Creep
    - 2) Stress relaxation
    - 3) Stress concentration
- I. Study models (Lec and Lab)
  - 1. Alginate
    - a. Composition
    - b. Procedure for impression
  - 2. Bite registration
  - 3. Gypsum
    - a. Composition
    - b. Procedure for pouring study model
    - c. Trimming study models
- J. Bleaching splints (Lec and Lab)
  - 1. Bleaching methods
    - a. Indications and contraindications for bleaching
    - b. In-office bleaching
      - 1) Types of bleaching systems
      - 2) Types of bleaching solutions
        - a) Carbamide peroxide
        - b) Hydrogen peroxide
        - c) Sodium perborate
      - c. Home bleaching methods
        - 1) Over-the-counter products
        - 2) Dental office supervised home bleaching
    - 2. Bleaching splint fabrication
      - a. Armamentarium
      - b. Procedure
        - 1) Vacuformer
    - 3. Problem solving
      - a. Sensitive teeth
      - b. Teeth resistant to bleaching
      - c. Tissue sensitivity
  - K. Pit and fissure sealants (Lec and Lab)
    - 1. Legal requirements
      - a. Dental Practice Act
        - 1) Supervision
      - 2. Purpose
      - 3. Indications and contraindications
      - 4. Types
        - a. Resin-based sealants
        - b. Glass ionomer sealants
      - 5. Selection of teeth
      - 6. Armamentarium
        - a. Sealant materials

- 7. Isolation techniques
- 8. Placement of sealants
- L. Tooth vitality (Lec and Lab)
  - 1. Methods of tooth vitality testing
  - 2. Interpretation of tooth vitality testing results
- M. Bases, liners and cements (Lec and Lab)
  - 1. Purpose
  - 2. Methods for mixing
    - a. Armamentarium
- N. OSHA (Lec)
  - 1. Hazard Communication Standard
    - a. Parts of the Hazard Communication Standard
      - 1) Written program
      - 2) Inventory of hazardous chemicals
      - 3) SDS forms
      - 4) Labeling requirements
        - a) National Fire Protection Association (NFPA) system
        - b) Pictograms
      - 5) Employee training
    - 2. Hazardous waste
      - a. Non-regulated waste
      - b. Regulated waste
        - 1) Recycled waste
        - 2) Red bag waste
      - c. Documentation of hazardous waste disposal
        - 1) Manifest
  - O. Mercury safety (Lec)
    - 1. Harmful effects of mercury
    - 2. Appropriate disposal of mercury and mercury containing items
    - 3. Mercury spill kit
  - P. Infection control (Lec and Lab)
    - 1. Laboratory infection control procedures and PPE
    - 2. Clinical infection control procedures
  - Q. Documentation (Lec and Lab)
    - 1. Chart write-up for clinical procedures
      - a. Placement of pit and fissure sealants
      - b. Delivery of bleaching splint
      - c. Pulp testing results
  - R. Ethical principles related to dental materials (Lec)
    - 1. Basic principles
  - S. Legal issues related to dental materials (Lec)
    - 1. Dental Practice Act
      - a. Allowable duties
      - 2. Informed consent

## Lab Content

- A. Clinical detection and management of dental restorative
- B. Mounting extracted teeth
- C. Pouring study models
- D. Trimming study models
- E. Restorative charting on student-partner
- F. Caries risk assessment and detection
- G. Tooth vitality testing
- H. Practice isolation techniques
- I. Pit and fissure sealants on typodont teeth
- J. Pit and fissure sealants on partners
- K. Cleaning partials and dentures
- L. Polishing partials and dentures
- M. Bleaching splint fabrication
- N. Deliver bleaching splint
- O. Practice using electronic caries detection devices

- P. Reading SDS sheets
- Q. Documentation in the electronic chart

## Special Facilities and/or Equipment

- A. Multimedia classroom/dental lab with individual work areas, dental lab equipment to allow for study model fabrication, plaster trimmers, polishing of removable prosthetic appliances and other basic laboratory procedures.
- B. Dental hygiene clinic, dental supplies and equipment, student instrument kit, typodont, personal protective barriers, expendable supplies kit, sterilization lab.
- C. When taught as a hybrid course, access to computer with email software and hardware; email address. Students must participate in lab sessions located on Foothill campus.

## Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

- Lectures exams and laboratory quizzes
- Performance evaluations in manipulating dental materials
- OSCE exam
- Individual and group presentation

## Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

- Lecture
- Cooperative learning exercises
- Oral presentations
- Laboratory
- Demonstration

## Representative Text(s) and Other Materials

Gladwin, MA, and MD Bagby. [Clinical Aspects of Dental Materials, 5th ed.](#) 2018.

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- A. Student presentations - oral and written using evidence based research.
- B. Weekly reading assignments from textbook and course syllabus, 30-50 pages.

## Discipline(s)

Dental Technology