

**DLT 222**  
**ADVANCED CERAMIC TECHNIQUES**

**COURSE DESCRIPTION:**

Prerequisites: DLT 217

Corequisites: None

This course covers the fabrication of metal-ceramic bridges; all-ceramic crowns; and shading, staining, and personalizing ceramic restorations. Emphasis is on bonding dental porcelain on base metal alloys, margination, contouring, shading, and soldering. Upon completion, students should be able to fabricate ceramic-to-metal bridgework. Course Hours Per Week: Class, 2. Lab, 9. Semester Hours Credit, 5.

**LEARNING OUTCOMES:**

The student will:

- a. Practice proper infection control procedures.
- b. Apply principles of occlusion in the construction of a ceramic restoration.
- c. Distinguish the different anatomic landmarks of the adult dentition.
- d. Show an understanding of the materials used during the manufacturing of a PFM or all ceramic restorations.
- e. Demonstrate familiarity with design principles and fabrication processes used in dental ceramics.
- f. Form wax patterns for porcelain-to-metal bridge restorations.
- g. Cast and contour metal frameworks in preparation for porcelain application.
- h. Apply opaque and porcelain to metal frameworks.
- i. Pre-solder and post-solder metal frameworks.
- j. Operate additional equipment needed to fabricate porcelain restorations.
- k. Contour and personalize porcelain restorations.
- l. Stain and glaze restorations.
- m. Polish metal.

**OUTLINE OF INSTRUCTIONS:**

- I. Introduction to advanced dental ceramics
  - A. Classroom lecture
    1. Presentation
      - a.) Definition
      - b.) Objectives
      - c.) Equipment
    2. Application
  - B. Diseases that may be contracted in the dental laboratory
    1. Lecture - review of infection control
      - a.) Types of diseases that may be contracted
      - b.) Various methods that can be taken to reduce the risk of disease
    2. References:
      - a.) Infection Control in the Dental Laboratory - R.R. Runnels
      - b.) NADL – Infection Control Program
      - c.) Handout
- II. Trimming dies and models - review

- A. Classroom lecture
  - 1. Presentation
    - a.) Types of margins

Ideal

Identification

Uses of each

- b.) Proper trimming of models
  - 2. Application
- B. Reference: Fixed Restorative Techniques, UNC pages 21-25

### III. Forming wax framework for porcelain-to-metal bridges

- A. Classroom lecture
  - 1. Presentation
    - a.) Slide presentation on design
    - b.) Margin adaptation
    - c.) Lingual formations for bridges
  - 2. Application
- B. Demonstration - waxing the copings and pontics for bridges
- C. Reference: Metal Ceramic Technology, Naylor pages 43-60

### IV. Spruing and investing ceramic bridge framework

- A. Classroom lecture
  - 1. Presentation
    - a.) Methods of spruing
    - b.) Advantages and disadvantages
    - c.) Distortion of ceramic wax ups

Why it is present

How to eliminate

- 2. Application
- B. Live demonstration
- C. Reference: Metal Ceramic Technology, Naylor pages 65-81

### V. Casting metal using manual casting machine

- A. Classroom lecture
  - 1. Presentation
    - a.) Crucible
    - b.) Torch
    - c.) Melting range of metal
    - d.) Machines to be used
  - 2. Application
- B. Live demonstration
  - 1. Spruing and investing
  - 2. Using the torch for casting
- C. Reference: Metal Ceramic Technology, Naylor pages 76-81

### VI. Contouring metal coping and framework in preparation for porcelain application

- A. Classroom lecture

1. Presentation
    - a.) Stones
    - b.) Diamonds
    - c.) Thickness of metal
    - d.) Contamination
    - e.) Handling the metal
  2. Application
- B. Demonstration - contouring the framework
- C. Reference: Metal Ceramic Technology, Naylor pages 93-105

VII. Opaquing metal framework and copings

- A. Classroom lecture
1. Presentation
    - a.) Consistency
    - b.) Thickness
    - c.) Modifications
    - d.) Application of porcelain
  2. Application
- B. Demonstration - opaquing the coping and framework
- C. Reference: Metal Ceramic Technology, Naylor pages 121-126

VIII. Building porcelain on bridge framework

- A. Classroom lecture
1. Presentation
    - a.) Consistency
    - b.) Modifications
    - c.) Application of porcelain
    - d.) Reduction of incisal edge
    - e.) Application of incisal porcelain
  2. Application
- B. Live demonstration
1. Packing-baking the single crown
  2. Packing-baking the bridge
- C. Reference: Metal Ceramic Technology, Naylor pages 115-144

IX. Review firing of porcelain -- one half hour

X. Soldering of high fusing metal before applications of porcelain

- A. Classroom lecture
1. Presentation
    - a.) Investment used and why
    - b.) Preparation of metal
    - c.) Investing of metal
    - d.) Adjustment of flame
    - e.) Comparison with casting flame
    - f.) Visual appearance
  2. Application
- B. Demonstration - soldering the framework
- C. Reference: Metal Ceramic Technology, Naylor pages 106-113

- XI. Post-soldering the ceramic restoration
  - A. Classroom lecture
    - 1. Presentation
      - a.) Preparing surfaces to be soldered
      - b.) Solder to be used
      - c.) Investing procedure
      - d.) Type of flame to be used
      - e.) Heating procedure
    - 2. Application
  - B. Live demonstration
    - 1. Investing the casting
    - 2. Heating the casting
    - 3. Soldering the case
  - C. Reference: Airforce manual Vol. III pages 145-147 Metal Ceramic Technology, Naylor
  
- XII. Custom staining
  - A. Classroom lecture
    - 1. Presentation
      - a.) Color wheel
      - b.) Stain application
      - c.) Color modification
      - d.) Stain personalization
      - e.) Glazes - artificial and natural
    - 2. Application
  - B. Laboratory demonstration
    - 1. Stain palette
    - 2. Shade modification
    - 3. Stain personalization
  - C. References:
    - 1. Ceramco Stain Manual
    - 2. Biobond Stain Manual
    - 3. Metal Ceramic Technology, Naylor
  
- XIII. Contouring, personalizing, glazing and polishing porcelain restorations
  - A. Classroom lecture
    - 1. Presentation
      - a.) Margins
      - b.) Contacts
      - c.) Line angles
      - d.) Incisal edges
      - e.) Occlusal table
      - f.) Relation of cusp to fossa
    - 2. Application
  
  - B. Live demonstration
    - 1. Grinding the porcelain to shape
    - 2. Occlusal anatomy
    - 3. Glazing

4. Polishing metal collars
- C. Reference:
  1. Fixed Restorative Techniques, UNC
  2. Metal Ceramic Technology, Naylor

XIV. Occlusion:

- A. Principles of occlusion
- B. Determinants of occlusal morphology and physiology
- C. Physiology of mandibular movements as they related to the fabrication of dental restorations
- D. Instruction sources:
  1. Air Force Manual 162-6, Vol. III Pages 49-61
  2. UNC Fixed Restorative 1972 Section 9, pages 79-96

**REQUIRED TEXTBOOKS AND MATERIALS:**

Sowter, Fixed Restorative Techniques, UNC Press.  
Biobond Technique Manual, Dentsply International.  
Metal Ceramic Technology, Naylor.

**STATEMENT FOR STUDENTS WITH DISABILITIES:**

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 686-3652 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.