



**Purpose:** It is the intention of this Administrative-Master Syllabus to provide a general description of the course, outline the required elements of the course and to lay the foundation for course assessment for the improvement of student learning, as specified by the faculty of Wharton County Junior College, regardless of who teaches the course, the timeframe by which it is instructed, or the instructional method by which the course is delivered. It is not intended to restrict the manner by which an individual faculty member teaches the course but to be an administrative tool to aid in the improvement of instruction.

**Course Title** – Dental Materials

**Course Prefix and Number** – DHYG 1319

**Department** – Dental Hygiene

**Division** – Allied Health

**Course Type:** (check one)

- Academic General Education Course (from ACGM – but not in WCJC Core)
- Academic WCJC Core Course
- WECM course (This course is a Special Topics or Unique Needs Course: Y  or N )

**Semester Credit Hours #:** Lecture hours# : Lab/other hours #      3:2:2

**Equated Pay hours for course** - 3

**Course Catalog Description** – Physical and chemical properties of dental materials including the application and manipulation of the various materials used in dentistry.

**Prerequisites/Co requisites** – DHYG 1339, 1304, 1261, 1227, and 1307 with a grade of C or better.

List Lab/ Other Hours
Lab Hours 2
Clinical Hours 0
Practicum Hours 0
Other (list) 0

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**Date** 5/10/11

**Reviewed by department head** Carol Derkowski

**Date** 5/10/11

**Accuracy verified by Division Chair** Carol Derkowski

**Date** 5/10/11

**Approved by Dean of Vocational Instruction or Vice President of Instruction**  
Stephanie Dees

**Date** 12-15-2011



**I. Topical Outline** – Each offering of this course must include the following topics (be sure to include information regarding lab, practicum, clinical or other non-lecture instruction):

DHYG 1319 DENTAL MATERIALS

COURSE OUTLINE

- I. Introduction
- A. History of Dental Materials
- B. ADA Evaluation Programs
  1. Council on Dental Therapeutics
  2. Council on Dental Materials, Instruments, and Equipment
  
- II. Properties of Dental Materials
  - A. Physical Considerations
  - B. Biological Considerations
  - C. Terminology and Concepts
    1. Dimensional Change: shrinkage or expansion
    2. Coefficient of Thermal Expansion
    3. Microleakage & Percolation
    4. Thermal Conductivity
    5. Galvanism
    6. Corrosion & Tarnish
    7. Absorption & Adsorption
    8. Wettability, Hydrophilic, Hydrophobic
    9. Biting Forces
    10. Stress
      - a) tensile, shear, compressive
    11. Strain
    12. Stress-Strain Curve = above equals deformation; below equals elasticity
    13. Elastic Modulus = stiffness
      - a) Elastic
      - b) Plastic
    14. Proportional Limit & Ultimate Strength
    15. Ductility, Malleability, Resilience, Toughness
    16. Hardness (Knoop, Rockwell, Moh's, Vickers, Brinell)
    17. Strain-Time (Viscoelastic strain & Viscous flow)
    18. Dynamic Modulus & Dynamic Resilience
    19. Flow & Creep
  - D. Application to Dentistry
  
  - III. Preventive Dental Materials
    - A. Fluoride Gels and Rinses
      1. Composition
        - a) APF
        - b) Neutral Sodium
        - c) Stannous
      2. Properties
        - a) thixotropic
      3. Manipulation

- B. Pit and Fissure Sealants
  - 1. Indication
  - 2. Composition and Reaction
    - a) Bisphenol A-Glycidyl Methacrylate (BIS-GMA) or Urethane Dimethacrylate
    - b) Polymerized by light (one component system)
    - c) Polymerized by organic amine (two component system)
  - 3. Properties
    - a) Mechanical bonding
    - b) Periodic re-evaluation for retention
    - c) Contraindications:
  - 4. Manipulation
- C. Mouth Protectors
  - 1. Indications
  - 2. Types and Composition
    - a) Stock
    - b) Mouth-formed
    - c) Custom-made
    - d) Thermoplastic polymers
      - (1) Polyvinylacetate-polyethylene polymer
      - (2) polyurethane
      - (3) rubber latex
      - (4) vinyl plastisol
  - 3. Properties
  - 4. Fabrication
    - a) Custom-made
    - b) Mouth-formed
  - 5. Care
- IV. Direct Esthetic Restorative Materials
  - A. Historical Perspective
  - B. Composite Restoratives
    - 1. Composition and Reaction
      - a) Filler Size & Composition
      - b) Coupling Agents, Organic Matrix, Pigments
      - c) Initiators and Accelerators
    - 2. Composite Systems
      - a) Two-Paste
      - b) Single-Paste
    - 3. Properties
      - a) Polymerization Shrinkage
      - b) Thermal Conductivity
      - c) Water Sorption
      - d) Radiopacity
      - e) Compressive and Tensile Strength
      - f) Elastic Modulus
      - g) Hardness, Penetration Resistance, Wear
      - h) Bond Strength
    - 4. Clinical Qualities
    - 5. Manipulation
      - a) Two-paste system
      - b) Single-paste system
      - c) Bonding Agents
      - d) Restoration of incisors
      - e) Core build-up
      - f) Temporary bridge construction
      - g) Repair of porcelain or composite
  - C. Ionomer Restoratives

- V. Dental Amalgams
  - A. Definition
  - B. Mercury
  - C. Silver Alloys
  - D. Amalgamation
  - E. Properties
    - 1. Dimensional Change
    - 2. Strength
    - 3. Creep
    - 4. Tarnish and Corrosion
  - F. Manipulation
    - 1. Selection of product
    - 2. Mixing Methods
    - 3. Factors In Mixing
      - a) Trituration
      - b) Undermix, normal mix, overmix
    - 4. Condensation
    - 5. Finishing
  - G. Bonding Amalgam to Tooth Structure
- VI. Finishing, Polishing, and Cleansing Materials
  - A. Definitions
  - B. Abrasion
    - 1. Rate
    - 2. Types
    - 3. Finishing and Polishing Techniques
      - a) Gold alloy
      - b) Denture base
      - c) Composite restorative materials
      - d) Hybrid ionomers
  - C. Prophylactic Pastes
    - 1. Composition
    - 2. Properties
  - D. Dentifrices
    - 1. Composition and role of ingredients
    - 2. Selection of toothbrush and dentifrice
  - E. Denture Cleansers
    - 1. Requirements
    - 2. Types
    - 3. Effectiveness
    - 4. Recommended techniques and precautions
  - F. Bleaching
    - 1. Composition
    - 2. Properties
    - 3. Techniques
- VII. Cements
  - A. Definitions
  - B. Cementation Composition & Reaction, Properties, Manipulation
    - 1. Zinc Phosphate Cement
    - 2. Zinc Oxide-Eugenol Cements
    - 3. Zinc Polycarboxylate Cements
    - 4. Glass Ionomer Cements
    - 5. Hybrid Ionomer Cement
    - 6. Composite & Adhesive Resin Cements
    - 7. Compomer Cement
  - C. High-Strength Bases
    - 1. Properties

- 2. Manipulation
- D. Temporary Fillings
- E. Low-Strength Bases Composition & Reaction, Properties, Manipulation
  - 1. Calcium Hydroxide Cement
  - 2. Resin Cement
  - 3. Zinc Oxide-Eugenol Cement
- F. Cavity Liners and Varnishes
- G. Special Applications of Cement
- VIII. Impression Materials
  - A. Definitions
  - B. Rigid
    - 1. Dental Impression Compound
    - 2. Impression Plaster
    - 3. Zinc Oxide-Eugenol Impression Material
  - C. Hydrocolloids
    - 1. Alginate Impression Material
    - 2. Agar Hydrocolloid Impression Material
    - 3. Agar-Alginate Impression Material
  - D. Elastomeric Impression Materials
    - 1. Polysulfide Rubber Impression Materials
    - 2. Silicone Rubber Impression Materials
      - a) Condensation type
      - b) Addition type
    - 3. Polyether Rubber Impression Materials
  - E. Disinfection of Rubber Impressions
  - F. Rubber Materials for Bite Registration
- IX. Model and Die Materials
  - A. Definitions
  - B. Types and Selection, Manipulation, Properties
    - 1. Gypsum products
      - a) Model plaster (type II)
      - b) Dental Stone (type III)
      - c) Dental stone, high strength (type IV)
    - 2. Metal
      - a) Electroplated copper
      - b) Electroplated silver
    - 3. Resin
      - a) Epoxy
- X. Waxes
  - A. Properties, Composition
  - B. Types
    - 1. Pattern Wax
      - a) Inlay, Casting, Baseplate
    - 2. Processing Wax
      - a) Boxing Wax
      - b) Utility Wax
      - c) Sticky Wax
      - d) Corrective Impression Wax
      - e) Bite Registration Wax
- XI. Gold and Nonprecious Alloys
  - A. Definitions & Gold Content
    - 1. Noble Metals & Base Metals
  - B. Gold Alloys
    - 1. Porcelain-fused-to-metal
    - 2. White gold alloys
    - 3. Cobalt-Chromium

- 4. Titanium
  - C. Biocompatibility of Alloys
  - D. Solders
    - 1. Brazing
    - 2. Fluxes
  - XII. Dental Casting of Metals
    - A. Definitions
    - B. Wax Pattern
    - C. Spruing
    - D. Investing
    - E. Investment Expansion
    - F. Wax Elimination
    - G. Casting the Alloy
  - XIII. Plastics in Prosthetics
    - A. Polymerization Process
      - B. Vinyl Plastics
      - C. Acrylic Plastics as Denture Bases
        - 1. Composition
        - 2. Properties
          - a) Room temperature-processed acrylic dentures
        - 3. Care of dentures
    - D. Plastics as Soft Liners
      - 1. Home reliners
    - E. Plastics as Prosthetic Teeth
    - F. Plastic-Metal Combinations
    - G. Light-Cured Dimethacrylates
    - H. Other Uses of Plastics in Dentistry
      - 1. Maxillofacial materials
      - 2. Temporary crown and bridge materials
      - 3. Tray materials
- XIV. Dental Porcelain
  - A. Composition
  - B. Classification
  - C. Properties
    - 1. Denture Teeth
    - 2. Porcelain Crowns, Veneers, Inlays
      - a) Fabrication Involving Hand Condensation
      - 3. Porcelain-Metal Bonding
- XV. Dental Implants
  - A. Natural Dentition Versus Implant Dentition
  - B. Titanium Types
    - 1. Endosseous
    - 2. subperiosteal
    - 3. Transosteal
  - C. Materials
    - 1. Metals
    - 2. Ceramics
    - 3. Polymers & Composites
    - 4. Coated Metals
  - D. Patient Selection
  - E. Professional Care
- XVI. Miscellaneous Materials
  - A. Suture Removal
  - B. Rubber Dam
    - 1. Rationale
    - 2. Manipulation

## II. Course Learning Outcomes

Course Learning Outcome	Method of Assessment
1. Identify, describe and recognize the classifications, Properties, composition, utilization and manipulation of materials commonly used in dentistry for restorative and laboratory procedures.	1. Lecture, lab, and exam
2. Properly mix/prepare the following materials: dental stone, irreversible hydrocolloid, and dental cements.	2. Lecture, lab, and exam
3. Apply pit and fissure sealants.	3. Lecture, lab, and exam
4. List proper oral hygiene techniques for care of dentures, partials, implants and other dental restorative materials.	4. Lecture and exam
5. Explain to the average patient some of the factors to be considered in choosing materials for treatment purposes.	5. Lecture and exam
6. Discuss the indications and contraindications for bleaching.	6. Lecture, lab, and exam
7. Place and remove rubber dam.	7. Lecture, lab, and exam
8. Remove dental sutures.	8. Lecture, lab, and exam

## III. Required Text(s), Optional Text(s) and/or Materials to be Supplied by Student.

Powers, J: Dental Materials, Properties, and Manipulation, 9<sup>th</sup> edition, 2008

## IV. Suggested Course Maximum - 28

## V. List any specific spatial or physical requirements beyond a typical classroom required to teach the course.

Classroom and lab space, special equipment and workstations. J221 lecture and J130 dental clinic and materials lab.

## VI. Course Requirements/Grading System – Describe any course specific requirements such as research papers or reading assignments and the generalized grading format for the course

### Grading:

A = 93-100

B = 84-92

C = 83-75

D = 74-67

F = 66 and below

### Evaluation:

Examinations 40%

Lab Projects 25%

Quizzes 10%

Final Exam 25%

**VII. Curriculum Checklist**

- **Academic General Education Course** (from ACGM – but not in WCJC Core)  
No additional documentation needed
  
- **Academic WCJC Core Course**  
Attach the Core Curriculum Checklist, including the following:
  - Basic Intellectual Competencies
  - Perspectives
  - Exemplary Educational Objectives
  
- **WECM Courses**  
If needed, revise the Program SCANS Matrix & Competencies Checklist.