



**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 -** Study of dental materials including the physical and chemical properties and application of the various materials used in dentistry. Student experiences include manipulation of dental materials in the lab setting.

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

**Prerequisites/Corequisites -** DHYG 1339,1304,1261,1227,and 1307 with a grade of C or better.

**Approvals – the contents of this document have been reviewed and are found to be accurate.**

Prepared by Brenda Bode	Signature <i>B Bode</i>	Date 9-11-07
Department Head Leigh Ann Collins	Signature <i>LAC</i>	Date
Division Chair Leigh Ann Collins	Signature <i>LAC</i>	Date 9-20-07
Vice President Dr. Ty Pate	Signature <i>T Pate</i>	Date 9-26-07



**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 incisals
      - 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 classification, 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 dental 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 a rubber dam.	7. Lecture and lab
8. Remove dental sutures.	8. Lecture and lab

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

Craig, R: Dental Materials, Properties, and Manipulation, 8th edition, 2004.

### IV. Suggested Course Maximum - 28

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

(classroom & lab space, special equipment or workstations, etc.): J203 lecture and J130 dental hygiene clinic and dental 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

A = 93-100  
 B = 84-92  
 C = 83-75  
 D = 70-74  
 F = 69 & below

Minimum grade of “75” required to pass course

### 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**

Attach the following:

- Program SCANS Matrix
- Course SCANS Competencies Checklist





Course Prefix & Number: DHYG 1319 Dental Materials	
<b>SCANS COMPETENCIES FOR THIS COURSE</b>	
Competency	Method of Assessment
<b>1 READING:</b> Locate, understand, and interpret written information in prose and in documents such as manuals, graphs, and schedules.	Unit Exams & Final Exam
<b>2 WRITING:</b> Communicate thoughts, ideas, information, and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.	
<b>3 ARITHMETIC OR MATHEMATICS:</b> Perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.	Lab exercises with alginate, stone
<b>4 SPEAKING AND LISTENING:</b> Organize ideas and communicate orally; receive, attend to, interpret, and respond to verbal messages and other cues.	Lab exercises with impressions, sealants
<b>5 THINKING SKILLS:</b> A worker must think creatively, make decisions, solve problems, visualize, know how to learn, and reason effectively.	Lab proficiencies, exams
<b>6 PERSON QUALITIES:</b> A worker must display responsibility, self-esteem, sociability, self-management, integrity, and honesty.	Lab exercises
<b>7 WORKPLACE COMPETENCIES:</b> resources; interpersonal skills; information; systems; and technology	Lab proficiencies
<b>8 BASIC USE OF COMPUTERS</b>	

## SCANS Matrix

Program: Dental Hygiene CIP: 51.0602									
LIST ALL COURSES REQUIRED AND IDENTIFIED COMPETENCIES									
Competencies								Course Number	Course Title
1	2	3	4	5	6	7	8		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	BIOL 2401	Anatomy & Physiology I
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	BIOL 2402	Anatomy & Physiology 2
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	BIOL 2420	Microbiology
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ENGL 1301	English Composition
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SPCH 1315 (or 1318 or 1321)	Fundamentals of Speech
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SOCI 1301	Intro to Sociology
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	PSYC 2301	Intro to General Psychology
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	HUMA	Humanities
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 1223	Dental Hygiene Practice
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 1227	Preventive DH Care
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DHYG 1235	Pharmacology for the DH
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 1261	Clinical DH 1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 1271	Service-Learning for Local Need
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DHYG 1301	Oral-Facial Anatomy, Histology, Embryology
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 1304	Dental Radiology
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DHYG 1307	General & Dental Nutrition
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DHYG 1311	Periodontology
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 1315	Community Dentistry
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	DHYG 1319	Dental Materials
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DHYG 1339	General & Oral Pathology
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 1431	Pre-clinical DH
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 2201	Contemporary DH Care 1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 2231	Contemporary DH Care 2
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 2362	Clinical DH 2
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	DHYG 2363	Clinical DH 3
<b>COMPETENCY REFERENCES</b>									
								<b>8 Basic use of computers</b>	
								7 <b>Workplace Competencies:</b> resources; interpersonal skills; information; systems; and technology.	
								6 <b>Personal Qualities:</b> A worker must display responsibility, self-esteem, sociability, self-management, integrity, and honesty.	
								5 <b>Thinking Skills:</b> A worker must think creatively, make decisions, solve problems, visualize, know how to learn, and reason effectively.	
								4 <b>Speaking and Listening:</b> Organize ideas and communicate orally; receive, attend to, interpret, and respond to verbal messages and other cues.	
								3 <b>Arithmetic or Mathematics:</b> Perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.	
								2 <b>Writing:</b> Communicate thoughts, ideas, information, and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.	
								1 <b>Reading:</b> Locate, understand, and interpret written information in prose and in documents such as manuals, graphs, and schedules.	